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An' de track's all right."
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The Journal of Traumatic Surgery and Occupational Diseases

The Law, the Science and the Economics of Industrial Health

Volume 3 JUNE, 1934 Number 6

Problems In Industrial Medicine

—*A Survey of Some of the Important Phases of This Subject Which Are Entitled to Present Consideration*—

by

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Consulting Industrial Hygienist,
Chicago

MANY of us are accustomed to thinking that industrial medicine is a new form of medical work. While it is true that considerable advancement has been made in the last 20 years, it may be of more than academic and historical interest to know that the real beginning of industrial medicine and hygiene dates from the publication of the first systemic treatise on diseases of occupation which was entitled "De Morbis Artificium Diatriba," published by Professor Bernardo Ramazzini of the University of Padua, Italy, in 1700. This work consisted of a consideration of the dangers of 43 different occupations, a chapter being devoted to each one. The book was translated into English in 1705 and also into French in 1711, and for a century this was the only textbook on this subject. Some of the descriptions of industrial and occupational diseases are surprisingly accurate, and one cannot peruse them without appreciating that even the older observers knew a great deal about this special development of medicine.

In more recent years, the importance of industrial medicine has been emphasized by the holding of international congresses on industrial accidents and occupational diseases. The last one of these was the sixth and was held in Geneva, August 3-8, 1931.

We shall not attempt to review the enormous strides made in industrial medicine since the early beginnings, because it is the purpose of this paper briefly to discuss some of the present vital problems in industrial medicine, and the possible steps which may be taken for their solution. The following subjects will be considered: (1) dust diseases; (2) diseases resulting from chemical hazards; (3) legal medicine; (4) protective procedures; (5) the evaluation of health hazards; (6) preemployment and periodic examinations; (7) the small industry; (8) the industrial executive; (9) health information for employees; (10) organization of industrial physicians; (11) undergraduate and postgraduate medical instruction; and (12) cost of service.

Paper delivered before Annual Meeting of Central States Society of Industrial Medicine and Surgery, at Peoria, Ill., May 16, 1933. Released for publication in *Industrial Medicine,* June, 1934.

Dust Diseases

THE problem of abnormal physical states arising from the inhalation of various industrial dusts is probably one of the most important confronting industry at the present time. It is a fact that the economic status of some groups has been very seriously threatened because of the large number of claims which have been lodged alleging the contraction of pulmonary disease through dust inhalation.

There are only two definite dust diseases in industry which are clearly recognized at the present time, namely, silicosis and asbestosis. The former can be contracted only by breathing a large amount of free silica dust over a considerable period of time and after certain conditions

of exposure, while the latter results from the breathing of asbestos dust under similar conditions. We, therefore, know the specific causes of these two clinical entities. A great deal more is known about silicosis than asbestosis, particularly regarding the postmortem and pathological findings.

In addition to the clinical and roentgenographic aspects, it is essential that fairly accurate data be obtained regarding occupational exposure; such information pertains to the chemical and petrographic nature of dusts to which the employee is exposed, the particle size of the dust inhaled, the concentration in terms of particles per cubic foot of air and the length of exposure in years. Although diagnosis rests primarily upon medical and roentgenographic findings, one cannot over-emphasize the real importance of the facts concerning occupational history and exposure. Many times these data are neglected by the physician.

Unfortunately there has been a confusion of terms used to describe and to name various types of lung abnormalities resulting from dust inhalation. Perhaps the greatest offender is the word "pneumoconiosis," which literally means dusted lung. It is evident from this broad definition that any person whether he had had industrial exposure or not, may have a pneumoconiosis. Obviously there must be many forms of pneumoconiosis which are quite common and not disabling. It is true that there are specific forms of pneumoconiosis, such as silicosis, asbestosis, siderosis, anthracosis, tabacosis, byssinosis, and others less well known. It would be less confusing perhaps if each type of dusted lung were called by its specific name and the general term pneumoconiosis declared obsolete.

Not the least of the difficulties besetting the clinician and the industrialist who must deal with the problem of dust diseases, is the lack of proper reporting of cases of actual dust disease. It is impossible, for instance, at the present time, to gain any fairly accurate knowledge of the incidence of silicosis in this country. Not until we have an adequate system of reporting which will place the burden of such reports on industry and industrial physicians, will we gain any approximation of the incidence of silicosis and other dust diseases.

Diseases Resulting from Chemical Hazards

ALTHOUGH no accurate knowledge is available concerning the exact incidence of diseases resulting from exposure to chemical hazards in industry, it is of more than passing interest that such hazards are probably the greatest of any single group. For example, in the four years' experience of the Division of Industrial Health of the National Safety Council, 60% of the inquiries relating to health hazards in industry concerned exposure to chemical substances, either as the original compounds used in manufacturing processes, or those which were evolved through chemical actions.

There are actually hundreds of vapors and gases used in industry or evolved from various manufacturing processes, which may or may not have a deleterious effect upon the human body, some producing actual disease and others producing injurious results which are temporary. There are others which may have no injurious effect whatever.

If we depend upon what meager reports are available through a few states, it will be discovered that the skin irritants and lead poisoning are the most frequently named offenders. There are many other types of chemical poisonings which occur, but not in such great numbers as to become statistically significant.

The industrial physician can be of great service not only to the employees entrusted to his care, as well as the employer who pays him, but to the public at large, in making an effort to absorb and understand the fundamentals of industrial toxicology; likewise he can increase his own knowledge and the collective knowledge of industrial medicine as well, by gaining a thorough understanding of materials, processes and practices in the plant which he serves. For a long time it was debatable as to whether the physician should go into the plant and make regular inspections and acquaint himself with the plant processes; it is no longer argued as to whether this is the thing the physician should do, for it has become highly necessary and is really a part of his work.

As in considering dust diseases, the reporting of industrial poisonings is also a very necessary procedure, if our knowledge is to be broadened and if we are actually to work out cause and effect relationships. Here again, the plant physician should be of great assistance in persuading the industrialist that it is not unfashionable regularly to report cases of occupational poisoning; in no other way can we expect to acquire greater knowledge and to add to our present store of information on this subject; surely in no other way can the actual occurrence and incidence of this type of disease be measured.

Legal Medicine

AN IMPORTANT phase of industrial medicine which has caused worry and anxiety to many physicians is that involving medicolegal relationships. The reasons may be various, but among them is the difficult principle of giving exact information required by attorneys; this involves the transmission of scientific medical data into precise mechanistic conceptions—the transmutation of biological observations into the field of expression of precise mathematical accuracy. Of course this is not always possible; in fact, in many instances, it cannot be done. Furthermore, this procedure is always fraught with danger—it is not always possible to evaluate mathematically or in precise enough terms the behavior, either physical or mental, of human beings.

Perhaps one major reason why physicians ordinarily shrink from the verbal barrage to which they are subjected in the courtroom is because they are not in the habit of giving reasons for their scientific deductions; of course these are frequently asked for during examination and cross-examination in legal procedures. The physician, therefore, must not only be logical in his statements, but also must corroborate what he has said; as Sir John Collie has so well put it, the object of interrogation of the medical witness is to test his memory and his candor.

Not the least of the difficulties of the medical witness is the necessity for speaking in terms which can be readily understood by the court and jury; these laymen are not accustomed to the frequent use of scientific and medical terms, and too often medical testimony takes the form of a polysyllabic hodgepodge which has no meaning to them.

Another trouble which confronts the proper functioning of the medical witness is the necessity for reliance at the present time upon subjective symptoms in coming to a decision as to disability. This is especially true in subacute and chronic conditions where the symptomatology and physical findings are commonly not characteristic—and in instances where medicolegal issues are such that claimants often "develop" their own symptoms. This is not, of course, the fault of the physician, but exists because of the lack of objective criteria of scientific soundness and dependability.

Of what great value, for instance, an accurate laboratory test would be in the estimation of the exact amounts of various inhaled vapors and gases before they produce clinical symptoms and consequent deleterious effects. But because we are ignorant of the so-called "threshold dose" of many poisonous substances commonly used in industry, the working out of this problem would involve animal experimentation and the development of quantitative methods. Here then, is afforded an unusual opportunity for the intelligent use of money by some foundation; the results would be of vital importance and assistance to an industrial nation such as ours. Obviously the project would embrace the cooperation and coordination of effort of industrial medical and chemical societies with industry, and if properly prosecuted would be productive of results leading to the solution of many of today's problems in occupational diseases. The data thus afforded would permit of greater accuracy in the differential diagnosis of compensation cases, making possible the expression of more positive medical opinion as to casual relationships.

Perhaps the most glaring defect in medicolegal work is the lack of coordination of effort between the medical and legal professions; this is especially evident in the lack of proper preparation of cases and the "rushing" of the collection of medicolegal evidence. It is encouraging, however, that the first real steps toward at least a partial solution of this difficulty have been taken—for example, the Los Angeles Bar Association has invited a special committee of the California Medical Association to meet with another special committee to discuss the problems of the physician as an expert witness and to outline procedures designed to make the valuable services of both groups capable of greater reciprocation. Other Bar Associations and Medical Associations should be stimulated to take similar steps, and such local and geographical nuclei might easily form the background for the inception of an active and virile national medicolegal organization. The objective is one demanding adaptability—to bridge the gap between the two great professional groups—to coordinate professional facilities in an attack upon common problems. It is not impossible of attainment and consummation would not only redound to the benefit of both professional groups, but would be also of benefit to the employee, as well as his employer.

Proctective Procedures

IN THE protection of employees against various injurious substances and processes, it is expected that the industrial physician will have an appreciation of some of the more important engineering aspects of this type of work. This

does not mean that the physician will go about the plant making tests with Pitot tubes or ultraviolet meters—it is not expected that the physician will become an illuminating and ventilating engineer. However, the plant physician and surgeon should know enough about the principles of engineering relating to the protection of employees, so that he may work intelligently with plant engineers and executives in relation to these problems.

Industrialists look upon the physician as an expert on the human body; such expertness demands that the physician be acquainted with the types of protective apparatus which may be worn by the industrial employee during the pursuit of his duties. Reference may be made here especially to the apparatus protecting the worker against the inhalation of injurious dusts, fumes, vapors and gases, as well as to protect the eyes against injury from mechanical, chemical or radiant sources. This will necessitate adequate knowledge concerning the development of protective apparatus, its possibilities and its limitations, which means keeping in touch with research and developments in this field and knowing the various kinds of head, eye and respiratory protective devices which are manufactured and placed on the open market for sale. Keeping abreast of the times on this subject will amply repay any physician whose work is concerned with these principles—and this means the majority of industrial physicians and surgeons.

Evaluation of Health Hazards

THE increased number of claims and the more frequent participation of industrial physicians, insurance companies, courts, and legislatures, in the interpretation and adjudication of claims all tend toward a more accurate estimation of the effect of actual and potential health hazards in industry. It is only natural that a physician should be called upon for information regarding the possible deleterious effects of any given set of circumstances in manufacturing groups; the various agencies before mentioned expect that the physician will be able to give some fairly accurate estimation of the effects of substances, methods, and processes to which the industrial employee is constantly exposed. One must admit that a great deal of knowledge on this subject is not available, but it should also be said that the things which we do know are not now being put to good use. Here again, the necessity arises for routine plant inspections and detailed study of the factors in the working environment that might be productive of abnormal physical conditions in the working group. Many a disputed claim today is finally closed by an erroneous decision because the physicians involved are not able to offer definite scientific evidence relating to the harmlessness or harmfulness of the conditions with which the points at issue were directly concerned. This subject, therefore, becomes at once a matter of scientific medical inquiry, and also one of legal implication.

Preemployment and Periodic Examinations

THE preemployment physical examination has been properly called the keystone of industrial health work; it is really the most efficient single check on physical conditions of the workers that is available to medical departments. Likewise the periodic physical examination is of especial help where there are known hazards existing in industry. More recently what has been called the "exit" examination has been proposed, this being used as the name indicates, to put on record the physical condition of an employee when he leaves the company.

You may well wonder why I mention examinations at this time when industry is in such a financial condition that little of this type of work is being done. My reason for doing so is because several authorities have mentioned that the previous type of examination must be entirely revamped and must be made more efficient and searching, if it is to get results when business is resumed. It must also be able to ferret out conditions which usually follow periods of financial depression.

The medical department should, therefore, concern itself very definitely with the revising of its forms and methods while there is time to make a definite study of these items. The medical department of the future will prove its value in direct ratio to the improvement in the technique of examination and record efficiency, for there will be a larger number of employees presenting themselves with conditions which must not be overlooked or which necessitate proper placement so as to minimize the hazard of the physical defects found.

Another important use of examination records which will surely find greater and more widespread application in the future is their legal value; in this relationship, the more detailed and thorough the information, the greater value the records will have for the purpose of defending disputed claims or meeting the contentions of misguided employees.

Another reason why industry will demand and must have more examinations of a better type in the future, is the increasing number of persons of middle age in the working population. This statistical fact makes it all the more necessary that better methods of detecting physical defects and following them up to see that they are properly taken care of, should be adopted by industrial medical departments.

The Small Industrial Group

SMALL industrial groups have always presented the problem of adaptation when considering a medical service. The main difficulty with the industrial executives in small groups is that they have persuaded themselves that a certain psychological fallacy is true, namely, that because they only have a relatively small number of employees, it would be impossible to provide medical supervision for them, no matter how great the need. Of course, this problem becomes of greater importance in the present situation of financial stringency, although the psychological fallacy is still potent. The truth is that upwards of ninety per cent of industrial organizations in this country employ even in good times less than five hundred persons in each plant. Approximately 95% of all industrial employees, therefore, are to be found in such organizations; it follows then that medical services and health supervision have not been applied to more than five per cent of the total industrial population.

This does not mean that successful service has not been rendered in small groups—this has been brought about principally in two ways: by the grouping of small industries in such a way that one physician is able to take care of several; or by one physician devoting part time to a small industry and giving the rest of his time to private practice, or hospital work. Interestingly enough there are instances of where groups employing three to four hundred persons have engaged the services of a full time industrial physician. Apparently these plans worked out not only for the advancement of the industry but also for the continued progress of the physician.

Perhaps no better example of successful medical work in small groups is available than the excellent work carried on by the Philadelphia Health Council and Tuberculosis Committee through its medical director, Dr. Glenn S. Everts. This plan was based upon the working out of a service for units of 1,000 employees, grouped geographically in such a way that they could be served by physicians and nurses devoting a prescribed amount of time to each unit. In the beginning a demonstration was given of what could be accomplished, the experiment being conducted over a period of several months; when the officials were satisfied as to what could be done, arrangements were then made to have the group continue its own service, the Philadelphia Health Council supplying the part-time personnel—salary and expense being paid by the industry. Through such a plan, the work became a "going concern," before the industry was obliged to pay for it.

It is obvious that the most important factor in the continuation of health service and medical work for small groups is the continued and proper use of part-time physicians and nurses. This should not detract from the quality or standard of the work done, for it is the part time physician who does most of the industrial work today, the figures showing that there are about 50 of the part time type to one of the full time medical man in industry.

The Industrial Executive

WITHOUT trying to be facetious, the industrial executive has been included as one of the major problems in industrial medicine, chiefly because it has been difficult to arouse his interest in the medical supervision of his employees. No doubt part of this difficulty has been due to the inability of the physician to acquaint the industrial executive with the real facts and issues, which when properly presented and followed-up, are many times effective.

In the past it has been a case of frenzied production versus economic and humanitarian foresight. To use an old saw, it has been said that "seeing is believing," but so is paying claims, and many executives have learned that an "ounce of prevention is worth a pound of cure." The great difficulty has been to procure instruments and ideas fine enough to weigh the ounce of prevention, when considered in comparison with the so-called exigencies and necessities.

The responsibility for this situation lies both with the industrial executive and the industrial physician as voiced by an editorial writer in a recent publication: "The industrial physician and the industrial executive have much in common —they are both interested in the efficiency and the productive capacity of employees; behind these elements is the continuity of employment, and such continuity is not possible without at least a fair or working degree of personal health.

"Too often the executive sees the physician as

a struggling professionalist, as an idealist dealing in unconfirmed diagnoses, in attempting to work out the puzzle of scrambled physical findings, laboratory data, and x-ray evidence. Contrariwise, too often the physician views the industrial executive as a hardheaded, 'budget-master' with little or none of the humanitarian instincts.

"The truth is that medical service in industry is a compromise between the ideals and humanitarian objectives of the practice of medicine on the one hand, and the exigencies of industrial and commercial competition on the other . . . The conference method of attacking problems has been much discussed, but not made use of to its full advantage. Might not an annual conference of industrial executives, including industrial relations personnel and officers, with industrial physicians, be at least a starting point toward the discussion of common problems and the ultimate achievement of common objectives?"

Health Information for Employees

ONE of the first principles of all good industrial medical service is to cause the individual employee to think about the value of good health for himself.

As Britton has so adequately expressed it: "Undoubtedly the principal reason for the present unsatisfactory state of constructive medicine in industry is because we have been thinking of the doctor and his individual ability, and not of the massed ability and interest of millions of workers. It has been repeatedly said that the progress of the safety first movement has come by 'selling' every workman on the idea that the safe way is the best way. It is evident that those problems which primarily affect the individual require his interest and effort if they are to be solved."

Many industrial physicians have often wondered why employees do not avail themselves of the opportunity of medical service in industry; when we consider Britton's statement and also understand that interest, understanding and action are prerequisites to cooperation, the reason is obvious.

Some years ago I had the privilege of pointing out in a paper delivered before the Lehigh Valley Safety Conference at Bethlehem, Penna., that administrators in industrial medical work should take advantage of the system which had already been put into effect by safety supervisors, namely, the organization of foremen and others responsible for men, into groups and units which would interest themselves definitely in accumulating and spreading health information among industrial employees. In this discussion, emphasis was also laid on the importance of coordinating the efforts of executives, physicians, nurses, safety supervisors, and foremen and other heads of departments.

As an approach to the working out of the principle of dissemination of health information, several years ago the National Safety Council published a booklet entitled "The Healthy Worker," which I was privileged to write, composed of a series of 23 popular health talks on pertinent subjects; this piece of literature gained a very wide circulation, not only among industrial employees, but also among their families, and was in some instances used as the basis for health talks and health instruction by physicians and nurses.

A little later, the Red Cross asked me to give as a part of the program of their regular Summer Institute of the Central States, a talk on the subject of "Health Courses in Industry." In this material were considered the why, the when, the who, the how, and the what of the use of health educational material and methods in industry. Using this paper as a basis, a number of files were subsequently assembled, on the general subject "Health Courses and Campaigns in Industry," which met with a very wide distribution through the National Safety Council. Not only was the philosophy of health educational work discussed, but also characteristic and illustrative material was gathered in this file and the best methods of presentation considered.

About the same time, the National Electric Light Association, stimulated by the demand for information regarding health material for industrial employees, decided to organize material and methods. The basis for this activity was the writing and publishing of a small book entitled "Your Health and Your Earning Power," to which I was privileged to contribute as one of the three physicians collaborating. Along with this printed material was a file for the use of supervisors and others, especially arranged by the National Electric Light Association Personnel Division.

Perhaps you wonder why I devote so much time to the discussion of this particular problem and also at this time. The reason is that the proper presentation of health material to employees has been very much neglected and will be of greater importance now and in the future than it ever has been before. The most important principle in dispensing such information is

to remember that the industrial employee must be entertained and at the same time instructed. Another important point is that management should take the employee into its confidence and instruct him in the dangers of the type of work to which he is exposed; in no other way will cooperation in protection be achieved.

Organization of Industrial Physicians and Surgeons

ONE of the most apparent defects in the progress of industrial medicine and surgery in the United States has been the lack of organization and concentration of effort on the part of industrial physicians and surgeons as a group of specialists.

There have been a number of national groups devoted to these special interests, among them the Section on Industrial Hygiene in the American Public Health Association, organized in 1914; the Division of Industrial Hygiene and Sanitation of the U. S. Public Health Service at Washington, D. C., the Section on Health Service of the National Safety Council, and the Section on Hygiene and Preventive Medicine of the American Medical Association (now including industrial medicine), all of which were organized in 1915. In 1916 a group of industrial physicians and surgeons planned the American Association of Industrial Physicians and Surgeons, which professional group has been instrumental in conserving the ideals of medicine in industry. Other local and regional groups have been formed and have attracted a number of members.

In spite of the apparent organization and progress, the membership of one of the representative national groups has never attained a total of over 350, and the sections of other organizations have never exceeded more than 100 in attendance and membership.

With approximately 40 to 50 million persons gainfully employed in the United States—with the losses from illness in industry totaling 10 billion dollars each year and with approximately 20,000 industrial physicians and surgeons in practice, after 15 years of experience, there must be definite reasons why industrial medicine has not assumed a more important place in our national life.

It would seem that the great opportunity lies in feeding a regular and nutritious diet of information and principles to the large number of part time industrial practitioners and the welding of them into a homogenous and coordinative group. The necessity for this procedure will be more evident when it is considered that time and money as well as effort must now be conserved as much as possible. The merging of these interests, therefore, would seem to be in order.

Such a plan would call for a more united effort on the part of industrial physicians and surgeons, greater concentration as to time of meetings and community of interest, more unanimity with regard to the publication of material which is pertinent, and other principles which will suggest themselves as activities of this sort are begun.

Undergraduate and Postgraduate Medical Instruction

IT IS NATURAL to assume that the standards of excellence of industrial medical and surgical practice depend largely upon two things; the nature and extent of undergraduate and postgraduate medical instruction and the facilities which may be utilized by the practitioner in keeping abreast of the times in this field.

The necessity for providing for "new blood" in this as in any other specialty should be apparent; succession is the order of the day and the successors must be trained.

In recalling my experiences in the past 10 years, in teaching in several different universities and contributing to the teaching material in several others with regard to industrial medical instruction, one outstanding objection seemed to be that the curriculum was already crowded. And yet in certain instances when presented properly to the university authorities, it was always found that a series of 10 to 15 lectures on pertinent industrial medical subjects could be included in one of the regular courses, usually the one on preventive medicine and hygiene.

Courses should be so constructed that the medical student will be exposed at least to the fundamentals of industrial medicine; this does not mean that every medical student will practice industrial medicine, but that he will have at least a basic exposure to knowledge which would be of value to him, should he decide to go into that field. It is quite obvious that postgraduate instruction is given mainly for those who are able to take advantage of it—who will always be in the minority—and it probably will be reserved for those who intend to devote their full time to the specialty. As before mentioned, there are probably 50 part time men to one full time man in industry today. As long as this ratio is maintained, the necessity for undergraduate instruction in industrial medicine takes precedence over

the postgraduate form, in most instances.

Didactic instruction should be supplemented by practical experience, such as the demonstration of clinical material either in the clinic or in the laboratory or both, in addition to plant visits and inspections. It is here that the undergraduate and the postgraduate should be brought together; hospitals should be included where there is a possibility of using the material. State and city departments of health can also participate.

In the development of this type of instruction, it certainly is not too much to ask that at least one medical school in every well-developed industrial region provide the means and material for practical and academic instruction in industrial medicine.

Some of you know the activities of various national and local groups regarding the certification of specialties in medicine. It may be that many years will elapse before this principle is applied to industrial medicine; possibly this is one of the things that is needed to raise the standards of industrial medicine to where they should be. Certainly any certification must necessarily be based upon the standards of undergraduate and postgraduate medical training; in this particular instance, there is much to be hoped for and a great deal more to be done in a practical way, before either standardization or certification can take place.

Cost

THE COST of medical service in industry is a perennial problem. It is a subject in which the industrial executive is always interested because he has to pay the bill, and perhaps it is a subject in which the industrial physician has been too little interested because he has not generally appreciated the significance of the economic phases of industrial medicine.

In attempting to convert the results of this service into figures, the industrial physician must bear in mind that there are both tangible and intangible returns from industrial medical service; no price tag, for instance, can be attached to the number of instances of the prevention of occupational injury and disease, nor can a financial equivalent be assigned to increased production, decreased operating costs, diminished unjust claims for compensation, improved home and community conditions, and improved relations between employer and employee.

In the serious consideration of tangible returns through medical service in industry, the chief difficulty has been in securing statistical data before the service was inaugurated, and comparing them with experience after the service has been put into effect—because many companies have no records of the factors which are ordinarily affected by medical service. However, there are enough instances available so that the statement can now be made that a medical service in industry will not only pay for itself, but will also actually show a saving after it has been in effect long enough for the returns to be experienced. As an outstanding example of this, the experience of the National Metal Trades Association can be cited, in which the practical returns of industrial medical service are summarized as follows: (1) 15 companies reported an average decrease of 50.6% in absenteeism due to all types of disability; (2) 87 companies credited the medical program for a considerable reduction in accident frequency for which definite figures were not available; while 10 companies estimated an accident frequency reduction averaging 23.6%; (3) 13 companies figured the reduction of compensation insurance costs as varying amounts which averaged 28.6%.

Another example of the economies of industrial medicine has been cited in contemporaneous literature; authorities have recently estimated that the average industrial employee loses seven days from his work on account of sickness during each year; it has likewise been estimated that $4 per day is a fair average wage; the loss in wages, therefore, per person per year on the average is $28 on account of sickness alone. It has also been estimated that a medical service can be supplied in many instances for an average of $7 per employee per year. We have seen in the experience of the National Metal Trades Association survey that absenteeism can be reduced from 25 to 50% and possibly more, and it is, therefore, reasonable to believe that a medical service would not only pay for itself, but also would be instrumental in reducing a portion of the tremendous loss anually experienced. In other words, a $7 per capita investment per year might reasonably yield from $7 to $14 in return. It must be remembered of course that this is based entirely upon absenteeism alone and does not take other loss factors into account.

In the present, and also in the future, the problem of the cost of industrial medical service is going to undergo some changes; executives will be sharply on the lookout regarding the control of expenses; many medical services will be expanded with the upturn of business, but you may be quite sure that those who are responsible for

the paying out of money will see to it that expenditures for medical services are very definitely controlled and good values received therefrom.

Comments

THE frequency and extent of occupational diseases may be realized when consideration is given to various estimates which have been made; for instance, it is said that of the 7,000 different occupations in industry, approximately four-fifths are associated with some degree of prospective harm for the exposed workman—this number does not include trauma as distinct from occupational diseases. It is also believed that some justification exists for maintaining that as many as one thousand distinct occupational diseases occur; these, however, do not give rise to an equal number of separate clinical entities because the manifestations are very similar for some different industrial complaints. However, the significance and importance of occupational diseases can be understood from these statements.

Another important point for our consideration is one which has been emphasized by McCord, namely that many physicians have sought refuge in what has now become a medical aphorism—"occupational diseases do not lend themselves to ready diagnosis." This, of course, is a fallacy as anyone knows who has had experience in this field; given the same amount of clinical consideration and study, which includes case histories, adequate physical examinations, and laboratory and roentgenographic findings, occupational diseases are not any more difficult to diagnose than many conditions found in general practice. The statement of this fallacy reminds me of Dr. Ethelbert Stewart's definition for the term malingering: "The diagnosis of the diagnostically destitute." However, I would modify Dr. Stewart's interpretation to say that the defensive aphorism concerning occupational diseases is probably the foolish refuge of the intellectually inert.

The responsibility of the medical profession for the adequate diagnosis of occupational diseases is clearly indicated. In previous years I have on more than one occasion had the temerity to state in public that so-called "expertness" in the industrial field would surely be usurped by those ill-prepared and unresponsible, unless the profession as a group took steps to prevent this eventuality. That this fear was warranted is now proved, for definite infringement has taken place in instances far too numerous for comfort. There is hope, however, because there is a growing tendency toward the formation of boards of expert physicians to be used in the adjudication of claims and in the guidance of legislative proposals. The profession itself must be made to realize the importance of efficient studies relative to the diagnosis of occupational diseases, purely from the phase of the medical aspects.

The importance of occupation as an integral part of every case history is deserving of special mention; not only does this include the immediate occupation, but it should also embrace information regarding previous work within a period of 10 years, and include the type of work done, as well as the processes and materials used. This may seem to be a large order, but the quicker we get general adoption of it as a custom, the better will be our results in reaching sane diagnostic conclusions. Many private physicians and some state boards of health have already adopted forms which include this item.

In attempting to explain some of the difficulties which arise through problems in industrial medicine, quite likely the explanation is contained in the question: Is there not considerable significance in the fact that the whole compensation system has been built up almost entirely on the surgical side to the neglect of the experience available through industrial toxicology and the pathological manifestations of nonsurgical conditions? This concept gains particularly in importance when it is known that approximately 60% of the health hazards in industry originate in chemical substances and processes. This does not mean that industrial surgery is unimportant and should not continue to assume its proper place in industrial practice; it does, however, establish the principle that more emphasis should be placed on industrial disease conditions and preventive phases of industrial practice, and definitely implies that the large body of information which is now available on this subject should be put to good use. Nor can it be said that more research is not needed, for this is attested by those who have had the most experience in this work.

Perhaps as important as any of these considerations is the principle that adequate cure in a number of instances of occupational disease is quite difficult; prevention, therefore, becomes of great importance and it is here that the pre-employment and periodic examinations, health information for employees, and protective procedures find their most successful application. In only one other specialty of medicine, pediatrics, are the possibilities for the application of pre-

ventive medicine greater than they are in industrial practice; and in no other specialty are the methods and practices of preventive measures subject to such direct control.

Conclusions

QUALITY of service is, then, the real criterion for sound progress in industrial medicine. The acquisition of this principle is possible through adequate training and preparation given early in the experience of the physician. We must go back to the medical school and expose the student to the fundamentals of industrial medicine, giving him at least the foundation for the use of this knowledge, should he become interested enough in it later to take up this kind of practice. We must also give an opportunity for postgraduate work to those who are to become the leaders in this field. Most necessary of all is the provision of adequate clinical material and literature for that large group of part time practitioners in industrial medicine at the present time, to aid in the preservation and continuance of high standards in this specialty.

The great need for research has been stressed time and again; there is here afforded an unusual opportunity for the creation of a foundation for the study of industrial diseases and the conditions which bear upon them; such studies should be prosecuted with full equipment for clinical, laboratory, roentgenographic, experimental pathological, and postmortem findings, which should be coordinated with occupational exposure regarding the chemical substances and processes involved as well as other environmental factors which enter into the production of the etiological factors causing morbid conditions in industry. This idea is not new, having been carried out on an extensive basis in the Milan Clinic, under the direction of Prof. DeVoto. Industrial clinics have been established in this country, notably that in connection with the Massachusetts General Hospital, the Vanderbilt Industrial Clinic at Columbia University, and others. However, none in this country has so far reached the high level of the continental clinics.

Finally, the possibilities for the development of industrial medicine in this country are beyond the imagination of anyone of us here. This great industrial country affords unequaled opportunities for controlled observations which can contribute greatly to our knowledge in succeeding years. The responsibility for this development rests chiefly upon medical schools and those whose duty it is to set standards of medical education in this country. However, the problems are of such great magnitude that they cannot be solved by any one group; so closely are all these contingencies bound up with the economic phases of industrial progress and the future stability of the medical profession as a whole, that it is sincerely hoped that authoritative bodies and a united medical profession will not only give due consideration to these difficulties, but also couple their deliberations with thoughtful and sustained action.

Electric Shock and Burns

A STUDY of three years' records in a prominent utility company of Philadelphia gives the following comparative figures in regard to electric shock and burns:

Of the total of 147 cases of electric shock and burns reported during the three years, 10% were fatal, and 37% involved lost time. Thus 47% were serious injuries. Less than 21% of all other accidents reported during the same period involved lost time or death.

An analysis of these injuries showed the following causes:

Failure to use protective equipment accounted for 39% of the electric shock and burn accidents, or 58 cases, as follows: no rubber gloves, 30 cases; no rubber protective devices except rubber gloves, 14 cases; insufficient rubber protective devices except rubber gloves, 12 cases; line truck energized from hot wires, two cases. Lack of personal carefulness accounted for 27% of these accidents, or 39 cases; no precautions taken where arcing is probable, shielding the eyes or wearing goggles, 25 cases; accidental contact with energized equipment not being worked on, eight cases; falls into energized equipment, four cases; working with hot line tools, one case; contacting hot conductors even though all protective devices were being used, one case.

Short circuits and grounds accounted for 25% of the accidents: while working with tools, such as screwdrivers, wrenches, bolt cutters, etc., 36 cases.

Miscellaneous accidents totaled 6%, as follows: contacting equipment supposed to have been de-energized, four cases; contacting equipment which was normally dead, such as street light wires, etc, two cases; defective equipment, three cases.

Gross disobedience of orders accounted for five cases, or 3%—*National Safety News* XXVIII: 38.

Industry and the Future of Medicine

—The Relation of Industry to the Newer Developments in Medical and Hospital Administration—

by

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IN AN ATTEMPT to suggest certain principles and policies which might be followed to advantage in the future development of complete and satisfactory medical care for all the people, particularly for the great mass of the industrial population, there are at least four parties or groups to be considered:

1. The worker and his family;
2. The doctor and his professional helpmates, including the dentist, the pharmacist, the nurse, the social worker and the public health worker;
3. The hospital, both public and private, and its allied institutions such as clinics and health centers; and
4. Industrial management, including particularly personnel and industrial relations representatives.

In this quadruple alliance or medico-economic quartet the interests and welfare of the worker and his family must be paramount; in fact, the other three agencies have as their sole reason for existence service or guidance to the individual. That theirs is no mean task may be judged from the oft-quoted phrase, "Whosoever will be chief among you—let him be your servant."

The Worker

THE WORKER AND HIS HEALTH — The physical status, health needs and economic hazards of the worker in industry, as well as of the population in general, already are so well known as to require little further comment at this time.

For industry as a whole the diseases which cause most of the disability and time lost from work are those of the respiratory tract, particularly the common cold and influenza. These diseases also are responsible for most of the fluctuations in the disability rate from month to month and year to year. Diseases of the nervous system, accidents in general, rheumatism, diseases of the digestive system, tuberculosis, pneumonia, heart disease and various miscellaneous conditions follow more or less in order of prevalence and frequency. Diseases of the heart and blood vessels, pneumonia and influenza, cancer, kidney disease, cerebral hemorrhage, accidents and tuberculosis are the leading causes of death. Among industrial groups of younger age, particularly of the female sex, tuberculosis still is a leading cause of death.

While most of the minor respiratory disorders, common digestive disturbances and other conditions of like nature are treated at home, the worker and his family require general hospital care for tonsil, adenoid and mastoid operations; confinements and mishaps incident to childbirth; accidents in general; and appendicitis, hernia and a long list of other abnormalities. In addition, the worker and his family frequently require the services of special hospitals for tuberculosis, nervous and mental disorders, and acute communicable diseases, as well as of institutions for chronic conditions, convalescence and rehabilitation.

THE WORKER AND HIS DOLLAR—The average amount per person paid for medical care each year amounts to $22, or about $100 per family.

This means that while a certain number of individuals and their families on account of good health have to pay little or nothing for medical attention, a small proportion require considerable medical and surgical care and have to pay much more than they can well afford from the standpoints of income and budget.

Of the total amount spent, about 30% is paid to private physicians and surgeons, 23% to hospitals, 18% for medicines, 12% to dentists, 5% to nurses and the balance to various other individuals or agencies. A regrettable fact is that over 3% of the money is being paid to irregular practitioners and cultists.

The chief conditions for which medical expenditures have to be made are diseases and abnormalities of the teeth, confinements and their complications, acute upper respiratory diseases, appendicitis, accidental injuries and diseases of the nose, throat, eyes and ears.

The Doctor

THE DOCTOR AND HIS PATIENT—The individual relation of doctor and patient always has been considered of basic importance in the practice of medicine. The possible disturbance of this relation supposedly is one of the objectionable features in any plan for group practice or group payment for medical service.

What is the significance of the word "individual" in this relation of doctor and patient?

An attempt to answer this question may point the way to some common ground which may be reached by the public, including the vast army of industrial workers, and the various groups of the medical profession in considering the future of medical care. If there is any lesson to be learned from the prevailing arguments concerning the economics and administration of medical care in the United States it is that neither the one extreme of the present unsatisfactory conditions nor the other extreme of a thoroughly socialized government-controlled form of medical practice is desirable or will suffice. By reaching some middle ground between these extremes, the economics, as well as the art and science of medicine, slowly and safely will move ahead to the advantage of all concerned.

Undoubtedly, the individual relation between doctor and patient connotes primarily a confidential relation which implies trust, reliance, assurance, faith, security, confession and intimate personal secrets. These desirable objectives, apparently, are of value to both doctor and patient. The doctor, more than anyone else, is fully aware of the utmost importance of the interaction between mind and body, and of the influence of one upon the other. Much of the doctor's success in treating certain forms of physical and mental illness, and much of the patient's favorable response to treatment, are due to the confidence which the physician inspires in the mind of his patient.

So long as the practice of medicine is both an art and a science there probably will be need for more or less of the confidential relation between the doctor and his patient. If the practice of medicine should become more and more technical and scientific, and less and less of an art,—a change which in itself necessarily must be gradual—it naturally would involve and require less of the strictly confidential relation.

The mind of the average doctor is so full of intimate medical confidences that he abhors the idea of trying to develop a "group plan." To him, confidences and groups are incompatible! It also is difficult for him to imagine the oath of Hippocrates being developed into the rules and regulations of a competitive medical corporation! After 2300 years the doctor hardly can be blamed for hesitating to give up the oath of Hippocrates and his own code of ethics, even for the report of a modern committee.

GROUP MEDICAL PRACTICE—A private group medical clinic, which may be described as a medical department store, is in competition with the individual private practitioner of medicine just as the usual department store or chain store is in competition with the individual shop or storekeeper. Probably during the lifetime of the present generation at least, the department store and the individual specialty shop, each having its own strong and weak features, in so far as the patronizing public is concerned, will continue to exist side by side; and as time goes on it will be a question of the survival of the fittest in giving satisfactory service, or it may be that each will have a permanent place in the scheme of things.

In the same way, and without attempting herein to cover the pros and cons of private group medical practice, it would seem that for a long time to come there probably will be room for the individual private practitioner of medicine and also in some communities, a few of these so-called medical department stores. In the meantime, the public, including the vast army of industrial workers, should be allowed the utmost freedom of choice in regard to the type of medical service of which it desires to avail itself, just as in most instances it is permitted to choose with reference to the purchase of other similar services and requirements of life.

THE DOCTOR AND HIS COMMUNITY—Of all people making up a community the doctor in the past has been one of the most "rugged individualists." In many instances he has been much too "rugged," and has looked even with contempt or ridicule on some of the required records and reports, statistics and charts, and health educational programs and propaganda of local community health and welfare associations and officials. The freedom and independence of the doctor at times have been abused. If this were not so his position in society would be far safer than it is today. What is necessary is the development and realization of the highest social ideals, including adequate medical care, without

the sacrifice on the part of the physician of his freedom to practice as an individual, if he so desires, or the sacrifice on the part of the individual of his right to choose his own doctor.

The doctor owes it to himself as well as to his fellows to become more group-minded and community-conscious. The day of state medicine would be less likely to materialize in the future if all private physicians would amend their code of ethics to include greater attention to mass trends and needs, mass prevention and protection, and mass health education. No longer should he follow the dictum—sufficient unto the doctor is the patient thereof! If the private practitioner has failed in the past to take his proper place and to assume his true function in preventive and curative medicine, it is because of the fact that he has thought too much of his individual rights and prerogatives and too little of his obligations and responsibilities to the public.

What is needed is not "socialized medicine" or "state medicine" but *better organized* medicine; medicine which is so organized that while it remains largely in the hands of private practitioners, it will reach rich and poor, city folk and country folk, children and adults, employed and unemployed, not only after disease has gained a foot-hold, but before disease has become apparent, and while the individual still is well and strong.

THE DOCTOR AND HIS INCOME—It is safe to say that the average doctor is underpaid, when all factors are taken into consideration, such as the cost of his education and professional training, the purchase and maintenance of modern equipment and the expenses associated with his office and his membership in professional societies through which he keeps up-to-date in his knowledge of progressive medicine. Various studies have revealed that for every physician who receives more than $10,000 as net annual income there are two receiving less than $2,500.

In addition to a rather low average income the doctor suffers from uncertainties with reference to his charges and collections. The doctor's bill, whether large or small, frequently is left until all other bills have been paid. This is grossly unfair to the doctor, and reveals an attitude of mind on the part of the public which should be radically changed.

THE DOCTOR AND HIS LEADERSHIP—In a medico-economic quartet, just as in a musical quartet, each member must work in harmony with the others, while at the same time recognizing one as the leader.

In this medico-economic quartet, consisting of the worker, the doctor, the hospital, and industrial management, the doctor naturally is best qualified to be the leader not only in determining the character and extent of medical and hospital treatment which may be necessary, but also in advising as to costs and methods of payment for them.

When the butcher, the baker and the automobile maker; and the minister, lawyer and other professional people, as individuals, give up, or are forced to give up, their rights to determine largely what their product or service is worth and how and when it should be paid for, based on the old economic guides of public demand and supply and fair competition, then and not until then will it be time for the doctor also to be taken over "bag and baggage" by the state; and for the practice of medicine to become nothing more than a periodic, compulsory, impersonal handling and grinding through a medico-political grist-mill, the nether or stationary mill-stone of which would be a poorly paid, inexperienced and uninterested doctor, and the upper or revolving mill-stone, a changing political machine with ward bosses for every human ailment!

In exerting his leadership, the doctor through his local, county and state medical societies might well create committees on economic relations to which should be added *outside representatives* of workers, hospitals and industrial management. Out of the deliberations of such cooperative committees undoubtedly would come a plan for the economic administration of medical and hospital care, developed from within and not imposed from without, which would meet the approval of all concerned.

The Hospital

THE HOSPITAL AND ITS PROBLEMS — According to the latest report of the Council on Education and Hospitals of the American Medical Association, for the year 1933, there were 6,437 hospitals in the United States with a capacity of 1,027,046 beds and 52,464 bassinets for children. This represents an increase of 12,692 beds over the previous year, which is only about half the usual annual increase in capacity for the last 25 years.

During the last year 7,037,982 persons were bed patients in hospitals, and 9,519,427 were visitors to out-patient departments of hospitals. In spite of this, there was an average of 216,775 idle

beds, of which 155,021 were in general hospitals; the rate of occupancy in the latter being only 59.9%. The average length of stay in general hospitals was 14 days.

The total number of patients in all hospitals was greater in 1933 than in 1929, but more people went to free and tax-supported hospitals than to private institutions. The latter have been the chief sufferers as a result of the business depression. In addition to low occupancy and a shorter average stay, in many cases these hospitals have had to contend with poor collections and greatly reduced income.

GROUP HOSPITALIZATION—It is not surprising that one of the results of the economic depression has been to stimulate and accelerate various plans in the interest of the financial condition of hospitals as well as of the economic welfare of prospective patients. Group hospitalization on the periodic payment or insurance plan is now in operation in various southern and western states, and more recently has been extended to one or two eastern states. Without going into the details or appraisal of such plans at this time, it may be stated that the American Hospital Association and a few local medical societies already have approved them, and a gradual extension of such programs may be anticipated if and when the various preliminary and tentative plans and experiments now in vogue are proved sound from financial and actuarial standpoints and are given the complete support of the public and the medical profession. The support of the doctors probably will depend on whether or not such insurance plans:

(a) leave out all medical care and attendance that can be paid for easily by the individual on the usual fee-for-service basis;

(b) do not interfere with the American principle of freedom of choice, particularly in the selection of one's doctor or hospital; and

(c) give the physician a voice with the layman in the organization, operation and control of such plans.

Industrial Management

THE PERSONNEL POLICY—Whatever the industry may be, the success or failure of industrial management depends to a large degree on its policies and practices with reference to the individual worker. As indicated by a recent leader in the personnel field:

"The personnel problem in an industry is a problem of individuals and of persons and not of averages or generalizations. A wise personnel policy in any industry would be a policy which would tend to bring out the best qualities in every individual and to weld and integrate the aggregate performance of all into the competent and harmonious team-playing cooperation upon which any successful group action depends. The responsibility for carrying out the personnel policy rests with every individual connected with the management in its day-to-day contacts with the general forces."

It is evident from the foregoing that personnel and industrial relations representatives, and the supervisory management in general, in attempting to bring out the best qualities in every individual, among other things, must be sincerely and actively interested in the physical health and safety of each individual worker, and without going to the extreme of a paternalistic attitude not only must provide the means for health conservation and sickness and accident prevention, but also must be in a position to guide and assist all workers who require such help to competent, skilled and economical medical and hospital care.

It is because of this potential management service to the individual worker, as well as the fact that most of the proposed plans for the periodic payment of medical and hospital care apply chiefly to the wage earner or the gainfully employed, and in some instances even involve approval of particular occupations by the insuring agency, that industrial management must be recognized as an interested and important factor in the consideration and solution of the problem of the future administration of medical and hospital care, particularly for the working population.

MANAGEMENT PARTICIPATION — It would seem unwise for an industry, as a group or company, to participate in hospital insurance plans through payroll deduction on any compulsory basis requiring a contract between the hospital insurance association and a large percentage of a company's employees, at least until the present preliminary, tentative and experimental stages of the group hospitalization scheme have been passed and the plan has become generally accepted by the public, including the medical profession.

When hospital insurance gets on to the same solid basis, and is as generally approved as fire, life and accident insurance, it apparently will be soon enough for the managements of industrial organizations to participate fully and completely

as partners through payroll deduction or otherwise.

If it is to be done at all, it probably would be desirable to have the periodic payment plan for hospital care promoted and sold at the outset on an individual or family basis, or at least to nothing more than small groups, rather than through industrial management on a large scale. The latter conceivably might cooperate to the extent of encouraging workers as individuals or small groups, through suitable company magazine articles and in other ways, to join such hospital insurance service associations if and when these organizations are approved by the local medical profession.

If or when industrial management agrees to include hospital insurance as one of its company personnel services to workers, it thereupon definitely becomes a partner in the plan, and it naturally will inherit certain institutional administrative problems and perplexities, possibly of a controversial nature, which might develop out of extraordinary or unjustified demands for hospital service, or out of incompetent and unsatisfactory service. This might even lead to the suggestion that if the principle of hospital insurance is good, separate industrial organizations in order to have complete control and direction of, and to assume full responsibility for, hospital care of their workers, ought to develop hospital insurance plans and hospital buildings and staffs of their own. This would result in competition with other private and public hospitals and would nullify some of the community cooperative purposes of such plans, and doubtless would be unwise from the standpoint of the majority of industries.

Conclusion

IF THE Medico-economic quartet, consisting of the worker, the doctor, the hospital, and industrial management, through their respective organizations, or duly appointed representatives, would only come together in the spirit of harmony and mutual helpfulness on some fair and common platform, there would be little need, in the ultimate solution of the various problems related to the economics of medical and hospital care, for that vociferous quartet made up of the so-called lay leader, the ubiquitous uplifter, the professional propagandist and the revolutionary reformer!

To this end it is suggested that local, county and state committees, possibly with a national commission on medico-economic relations, made up of representatives of worker, medical, hospital and management groups, be organized to develop a broad, comprehensive and flexible national plan based on time-honored American ideals and principles, and adaptable to different local conditions and needs.

There has been enough preliminary study and talk—let us proceed to organize for the important task ahead; only in this way may we become real servants to humanity!

Cancer in Industry

By Dr. Claude William Chamberlain,*
Assistant Superintendent of Social Hygiene, Division of Communicable Diseases, Illinois, Department of Public Health, Chicago

IN ILLINOIS the death rate from this disease has gone up from 82 per 100,000 population in 1918 to 116 in 1932. From about 5,000 per year prior to 1920, the number of deaths from cancer has climbed to over 9,000 annually in Illinois. The recent increase has been more rapid among men than among women. While nearly all the mortality is among people over 40 years old the death rate has increased much more rapidly than the proportion of people in the cancer age, and much more rapidly than the improvement in diagnostic methods.

About 12 out of each 100 people who die in Illinois are the victims of cancer; and it is estimated that there are now about 27,000 people in Illinois with cancer, and that the disease is still in the early stages in about 20,000. Where the disease appears in accessible parts of the body the early symptoms can, therefore, be detected and many people may be cured. It was the early diagnosis which enabled the doctor to cause the decline of tuberculosis at a rate twice as fast as cancer has increased. Early diagnosis and early treatment are the answer to the cancer problem.

But it is the subject of cancer in industry which we are discussing today and the most alarming fact has to do with the opinion that there is a positive correlation between the economic status of the individual and the higher cancer rate. In other words, the highest mortality rates are found among the industrial population. In terms of economic status, a great life insurance company reports that the incidence of cancer "would seem on its face to be most highly represented in the poorest groups of the population, that the rate decreases as we approach the

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* Radio Talk, WCFL, March 30, 1934.

more prosperous people, and that this is generally true of both sexes and at most of the age periods."

This conclusion is decidedly contrary to the prevailing opinion as expressed in the cancer literature of the past, but Knight and Dublin have gathered impressive statistics to prove the opinion. Just what the reason is for the increase is yet in question, but the figures show that the rate in the industrial department of the company is 140 per 100,000 as compared to slightly over 54 per 100,000 in the intermediate and ordinary departments. This is for males over 25 years of age.

For women over 25, the rate in the industrial department is 197.7 per 100,000 as compared with 91.2 and 87 per 100,000 in the ordinary and intermediate departments, respectively.

These figures are for the years 1914, 1915 and 1916. Since 1921 the annual rate of increase has averaged about 1%. The death rate from cancer of the stomach, liver and esophagus among men declined between 1926 and 1930, but rose in 1931. On the other hand, the mortality from cancer of the peritoneum and digestive tract below the stomach among men has significantly increased from a rate of 39 in 1911-1915 to nearly 53 in 1926-1930.

Deaths from cancer of the stomach and liver among females have been declining, but cancer of the breast, peritoneum, intestines and rectum have shown an increase.

For the entire period between 1911 and 1927 the excess among males in industry at the ages of 45 to 74 years was about 25% greater than in those of higher economic status. These figures are for all types of cancer. The death rate from cancer of the mouth and cheek cavity is found to be about twice as high among workers in industry as among those in better circumstances; that from cancers of the stomach, liver, and esophagus is found to be about one-third higher in the industrial class. Cancers of other organs show little difference among the economic levels. Dublin concludes that some forces have been at work since the beginning of 1931 to cause a marked acceleration in the number of deaths reported from cancer. Aside from the factor of more accurate diagnosis there is no doubt that we are confronted with some influence that is increasing the true incidence of cancer.

It may be that economic distress which discourages frequent physical examinations, treatment or necessary surgery is an important factor. So many people have been unable to get expensive medical attention or have been unwilling to plunge into debt that probably many lives have been lost which might have been saved had the desired aid been available.

Then there is the theory of the psychologist that a state of mind of frustration, worry and a sense of inadequacy are factors in the development of progress of cancer. Elinda Evans, a colleague of Jung, has written a book on the subject which has created much comment.

It would seem that many cancers are the result of nature's effort to eliminate the individual who has passed the age of youth and what in past centuries was the age of greatest efficiency, particularly as regards the propogation of the species.

Morley Roberts, in his book, "Malignancy and Evolution," tells us that cancer is essentially a disease of civilization—white, Northern European and American civilization. He explains that we, the supposed pinnacle of all animal life, are even yet changing and evolving, and how the stresses, the terriffic speed and harrowing worries of modern life are the irritation that cause this or that group of cells and tissues within us to react, to grow, and often to grow bolshevistically, disastrously. But he tells us too of the marvelous forces of repair, of restraint, that are working in us all the time to hold in check those cells in the mucous membrane of the stomach or mouth or anywhere that are being irritated into lawless and fatal rampage. And how those forces of repair may be strengthened, nourished by a maximally healthy and serene existence. Today as cancer increases, our life, too, has become increasingly urban. That doesn't mean that cities in themselves are inherently what causes cancer. But he shows how cities as they are now, deprive the great mass of people of pure air, of sunlight, of natural food, and cause millions to live in the shadows, on hastily gulped food that may be lifeless or badly cooked. The city man, if rich is worried, harassed and hounded by his wealth, the poor man by his poverty and fear of losing his job. The factory worker, beset by unhygienic conditions or unsatisfactory associations and environment, chafes at his restrictions and frustrations. Who can say definitely what this chronic condition does to his glands and their secretions?

Roberts has been humble enough to go to sociology in his effort to explain the cancer mysteries that pathologists who disdain sociology wish to call their own. His whole astounding picture of cancer is based on his comparing the fantastic arrangement of half-friendly, half-hostile

cells that form the commonwealth of our bodies, with the half-friendly yet hostile way in which groups of human beings bind themselves together into the commonwealth of a nation. He sums up social and human cancers with the words: "A fed and happy worker is no revolutionist."

Some Phases of Occupational Skin Diseases *

AMONG the occupations in modern industry which are responsible for a large proportion of skin irritation and dermatosis may be mentioned painters, decorators and paperhangers who work with turpentine, benzine, lacquers, colors and paste; brick layers, masons, plasterers and others who work with lime and cement; woodworkers who use special woods, colors, varnishes and glue; oil and grease workers; metal workers, electroplaters, silversmiths and jewelers who work with acids, metal dust, polishes, oils, and solutions of poisons; printers, lithographers and engravers who work with acids, colors, benzine, and metals; motor mechanics, garage employees, gas station attendants and truckdrivers who work with oils, gasoline, denatured alcohol, lacquers, cleaning compounds, varnish and rubber; chemists and pharmacists; photographers; barbers, undertakers, hairdressers, and beauty parlor operators who work with cleaning fluids, dyes, soap, water or embalming fluid; physicians, nurses, dentists and hospital attendants who work with soap, water, disinfectants, antiseptics, alcohol, anesthetics and machinery such as the x-ray; cloth workers, tailors, dry cleaners, milliners, and fur workers who use dyes, cleaning fluids, and chemicals; leather workers, cobblers, shoe makers and tanners who use chemicals or work with dyed leather; market men, cooks, butchers, grocers, millers, bakers and confectioners who work with flour, sugar, meats, rabbits, salt and bones; fish dealers; farmers, gardeners and florists who work with bone fertilizer, fungi, insecticides, chemicals, and poisonous or irritating plants; common laborers who work exposed to heat or cold, lime, cement, tar or chemicals; domestic servants working with water, soap, cleaning fluids, insecticides and chemicals; laundry workers who work with washing powders, soaps, water, alkalis and chemicals; pearl button makers and bone button workers who handle infected shells or bones.

In some states and in some foreign countries, according to Dr. K. G. Zwick, occupational skin diseases are responsible for the greatest number of claims filed against employers. For instance, he says, this type of occupational affection was responsible for 60% of the total number of cases reported to the industrial commission of Ohio for the years 1927, 1928 and 1929; in Connecticut for the year 1928 the percentage was 58; in Massachusetts for 1927, 36%; in New Jersey for 1928, 30%; and in New York for 1930, 20%. German figures show from 50 to 70%.

The variation in percentage probably is due to local conditions in manufacturing and the difference in materials used in industry. He goes on to say that: "As occupational skin diseases have always been with us and as the incidence of industrial skin disease continues high, notwithstanding the introduction of labor-saving machines which reduce the frequency of the contact with harmful substances, additional prophylactic measures seem necessary besides those suggested by McConnell, R. Prosser White, and others which retain their usefulness.

"It is suggested that a cutaneous tolerance probe may be useful: (a) to detect eczematogenic substances; (b) sensitiveness (idiosyncracy) in applicants for work.

"The cutaneous tolerance probe is suggested as an additional measure for determining fitness of an individual for a specific job, besides the customary routine physical examination of the body in general and of the skin in particular. Since 5% of all individuals are known to have a congenital defect (idiosyncracy) of the skin which predisposes to eczema; and because of the larger percentage of individuals who on account of their acquired state of allergy have a tendency to eczema, it is my idea that the fitness of the largest organ of the body should be investigated more frequently."

Industrial Medicine calls attention to the report of Dr. Louis Schwartz of the U. S. Public Health Service on the subject of industrial dermatitis and says: "Because of compensation provisions, the affection is given more attention abroad than in this country. Industrial dermatitis comprises about 50% of all compensation cases in this country, and the difficulty is that only those cases are reported that are away from work one week or more; therefore, many cases are not recorded. Industrial skin lesions are found associated with many industries and occupations; the hospital reports available are very meager in their statistical information. In a total of 19,000 industrial compensation cases in various states, it

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* Another Radio Talk by Dr. Chamberlain, WCFL, March 16, 1934.

was found that 9,000 were due to industrial dermatitis; using these statistics a rate of 48 per 100,000 persons was worked out as the yearly rate for cases of industrial dermatoses. In an unselected group of 18,500 cases, 20% were found to be due to general irritants; 13% due to plant and vegetable sources; 10% due to dyes; and 10% due to gasoline and other solvents. Only 11 states compensate for skin diseases; one state has general coverage; others name specific agents causing skin irritation."

Osborn and Putnam, in the *Journal of the American Medical Association*, after reviewing the literature on industrial dermatoses, summarize their findings by sorting 216 cases into six groups.

GROUP 1. (104 cases) Discusses a situation in a rayon manufacturing plant where, in the winding department, a sulphonated oil was used. After three days the first case was reported and at the end of two weeks 104 employees had developed dermatosis. A change to nonsulphonated oil resulted in no further cases.

GROUP 2. (15 cases) Linemen in a public utility organization developed an affection of the hands varying from mild erythema to severe bullous dermatitis, extending to the face and neck. It was found that the cause of irritation was a new brand of rubber gloves worn by the workmen while engaged on high-voltage lines.

GROUP 3 (11 cases) Of 11 florists, 10 were found to be sensitive to chrysanthemums or pompoms which they handled. The other case was due to tulips which had been handled for many years before showing signs of irritation.

GROUP 4. (26 cases) Following an explosion in an aniline dye factory, pipe-fitters on the repair job developed a severe dermatitis on the face, neck, hands and arms. Investigation showed that the difficulty was due to contact with chemical dust which had collected for years on the pipes.

GROUP 5. (8 cases) Change in the apparatus in a chrome plating establishment exposed men to cyanide fumes and three days later a mild dermatitis appeared on the hands, face, neck and arms.

GROUP 6. (miscellaneous, 39 cases) The patients in this group came from different industrial plants. Four showed a positive patch test to a chemical used as a rubber accelerator; two gave positive patch tests to sulphur powder; four gave positive reactions to nitrosophenol; and three others showed positive for dinitrochlorbenzol. The following substances caused sensitivity in other cases: "flytox," varnoline, mineral spirits, kerosene, benzene, turpentine, acetone, xylene, crude coal tar, potassium cyanide, formaldehyde, thymolac, laundry chemicals, cleaning chemicals, soap, podophyllin, flour dust, cuco, and procaine hydrochloride.

At the close of the report, the investigators make certain statements which are of great importance to industrial physicians:

"Ninety percent of industrial dermatoses are due to allergy and mycotic infection; recent advances in our concepts of these two types of industrial dermatitis are such that many controversial problems can be definitely settled. Snapshot diagnosis is passe. To give a proper examination and diagnosis requires much patience, time, inquisitiveness and detective ability, as well as proper laboratory facilities. Large collections of substances used in industry must be kept on hand for patch tests, while proper specific laboratory facilities must be available for mycotic investigation. The time and energy expended to determine the exact cause of a given case or series of cases are well worth while.

"The economic phases of industrial dermatitis are of great importance. To those familiar with industrial court cases, it is evident that large sums of money could be saved by industry if a prompt diagnosis, backed by scientific proof, were made and preventive measures instituted. Although it is the employee who benefits most, no honest workman desires to live on compensation and be deprived of his full earning capacity, not to mention the great amount of suffering due to dermatitis; if a change of occupation is indicated, the sooner it is accomplished, the better for all concerned."

Cyanide Poisoning

IT MAY be suggested that a rational procedure in managing a case of cyanide poisoning, based on animal experiments, might consist of (1) immediate administration of amyl nitrite for from 15 to 30 seconds, to be repeated every three to five minutes if the patient is unconscious and rigid; (2) gastric lavage at once if the poison is taken by mouth—preferably done by another physician for division of labor; (3) artificial respiration by hands in case of gasping while the administration of amyl nitrite is continued; (4) frequent counting of pulse and respiratory rates, and (5) continuous observation of the patient for at least the first 24 hours.—Chen, Rose and Clowes, in *J.A.M.A.*

Silicosis: Current Literature

—Abstracts of Leading Articles—

By ELLA M. SALMONSEN
Medical Reference Librarian,
The John Crerar Library, Chicago

Silicosis

HOWARD B. GOODRICH
(*J. Missouri M.A.* 31: 193-198, May, 1934)

COULD a busy physician read but one article on silicosis, he might well select this one by Dr. Howard B. Goodrich, of Hannibal, Missouri. In a remarkably clear, brief and vivid manner he presents the subject in logical sequence under 12 aspects: what silicosis is, the pathology of any dust inhalation, etiology, time development and predisposing factors; silicosis pathology and symptoms, subjective and objective; diagnosis, prognosis and treatment; prevention: by examination and care of the worker, by control of dusts in the industry.

The disease is 29% fatal in South Africa in simple silicosis, 89% fatal when associated with tuberculosis. It is conspicuously a disease of the high-speed tools of modern industry. From 1890 to 1925 the death rate from tuberculosis alone, in the United States, fell 50% but in the same period tuberculosis from dust inhalations was 13 times greater as a cause of death.

Dr. Goodrich thinks the treatment unsatisfactory. Even if the worker stops working in silicious dust without any symptoms, these may develop later on. Once a man develops prominent symptoms, stopping the work will not prevent the unfavorable progress of symptoms and pathological changes. If tuberculosis develops in connection with the silicosis, the tuberculosis must be handled as if primary and the prognosis is poor.

Preventive measures are more hopeful than treatment. The worker beginning work in a dusty occupation should have a thorough physical examination, including roentgen rays of the chest to be sure there is no old or lurking damage. All this should be repeated every year. Beginning fibrosis from silica dust or supervening tuberculosis can thus be detected.

The dusts can also be proceeded against in the industries. After blasting in mines the air can be sprayed with water before a new shift goes on duty. In buildings extreme cleanliness and forced ventilation with exhaustion of dust from the air can keep the dust below the danger levels. In many mines and industries where excessive dust prevails, automatic systems of water-spraying run all the time. Respirators have been used extensively, but do not exclude the tiny particles of silica responsible for silicosis. Research should continually go on concerning the proportion of dust which can be safely endured in a given volume for every industry.

When safety standards have thus been determined, the industries themselves should adopt codes controlling the silica dusts within safety limits. Otherwise the several states would have to regulate the industries involved.

Silicosis Legislation Looms

(*Eng. & Min. J.* 135: 2, January, 1934)

EDITORIALLY the *Engineering & Mining Journal* reports on replies from the Departments of Labor in the several states to a letter sent out by the *Journal* which inquired into the status of silicosis legislation. Lack of replies from even important metal mining states prevented any complete tabulation in the January number.

The Deputy Commissioner of Labor for New Jersey wrote that silicosis did not come under the operation of the Workmen's Compensation laws. A strong feeling existed, however, among people of the state that silicosis should be compensable and that an intelligent medical board selected by the state should pass judgment on silicosis cases, to remove decisions from the controversies arising when expert medical testimony is purchased by employer and employee.

West Virginia's Commissioner of Labor stated that occupational diseases did not come under the state compensation laws. A bill introduced in the 1933 legislature provided for silicosis compensation, classified the disease into first, second and third stages, and made lump sum awards according to the stage involved. The bill was opposed as a first step toward including occupational diseases under the West Virginia compensation laws, and was defeated. Efforts to renew consideration of so important a matter will no doubt be made at the next session.

Silicosis Compensation

H. D. KIESER
(*Eng. and Min. J.* 135: 34-36, Jan., 1934.)

THE first of a series of articles upon "Silicosis Compensation" appeared in the January, 1934, number by the Associate Editor, H. D. Kieser. As the cause of disability, illness and death to hundreds of thousands of workers

in occupations with dust hazards, silicosis is now included for compensation in the laws of various countries, states and provinces of the world. There are four ways of securing it.

In some places compensation is allowed under a general workmen's compensation act, as in certain of the United States and of South and Central America. In lists of compensable diseases silicosis occurs in various European states, in Latin America, Australia and Canada. In clauses in acts for special schemes of compensation, silicosis is provided for in England and New South Wales. By special act Switzerland, the South African Union, New South Wales, Tasmania Western Australia and New Zealand furnish silicosis awards.

These facts and many more, such as the kind and date of the laws, the dust diseases, descriptions of occupations exposing workers to injuries from dust, together with the geographical areas involved, are given in a convenient diagram in excellent type.

The United States is not included in the chart, as only 11 states have workmen's compensation laws, and no state mentions silicosis directly. But detailed analysis is given the status of silicosis in the various states where now and again silicosis has come in for special award under varying occupational provisions.

The status abroad is discussed in terms of mining statistics of work done, its value, and outlay for silicosis damages. Medical control is indicated for areas that insist upon it.

In the United States silicosis compensation has been hindered by association with forms of racketeering bitterly resented by employers.

The reference value of this series of articles is high and will undoubtedly awaken as well as maintain active interest in the subject.

Silicosis Legislation With Special Reference to New Jersey

BENJAMIN F. TILLSON

(*Eng. and Min. J.* 135: 68-70, February, 1934.)

AS A SECOND article in the Silicosis Legislation series, Benjamin F. Tillson, Consulting Engineer, Montclair, New Jersey, emphasizes the economic burden that silicosis compensation will lay, however justly, on industry. A Canadian report is estimating the expense of mining and concentrating every ton of gold ore, allows one dollar for silicosis damages in every five dollars of cost. Twenty-two industries are listed whose workers are subjected not only to silica dust hazards but also to dusts from other minerals or metals.

Compensation laws when adequately drawn afford protection to employer and worker from racketeering agents who in some cases in the United States have exacted a fee of from 1/3 to 1/2 of the judgment granted and in others have obtained 80% of the entire allotment. Tunnel contractors, sand pulverizers, ceramic industries and foundries using sandblasts have been more recently preyed upon. In five states silicosis legislation is now in the making. In no state with workmen's compensation laws has silicosis, as such, been mentioned.

The proposed law for New Jersey provides much ground for profitable discussion, valuable to other states having such legislation in view.

Mr. Tillson emphasizes the numerous scientific aspects of the silicosis problem and suggests their representation through experts on the Commission. Doctors and pathologists have been gathering this information 30 years.

The bill is too narrow in the dangerous dusts named. Only a few inorganic dusts are specified, and coal, though organic, is mistakenly included. The term pneumonoconiosis applying to all lung diseases due to dust inhalation, is not used. Silicate minerals as well as silica (quartz) are not listed, some of which are highly disastrous to workers. Coal dust gives rise to anthracosis, but combined with silicates results in severe silicosis.

Both diseases should be compensable.

The injury to the lungs is limited in the bill to "substitution of fibrous tissue for the elastic lung tissue" as the only injury constituting damage, thus failing to protect the worker adequately.

Toxic minerals, lead, arsenic, and manganese, which furnish mineral and chemical dusts should be covered as injurious inhalations.

The Board of Control should include an engineer with industrial experience. A petrologist would be of great value.

The time limits for compensation are too narrow. The burden is thrown on the last employer which is totally unfair as the disease is long in development and duration and may involve several employers. Time limits would be much more justly ascertained if x-rays were insisted on, both when employment begins and terminates.

The New Jersey bill is praised as avoiding codes. More research may reveal other dust agents and cause change in the dust volume content considered standard now.

Silicosis: Its Causation

Benjamin F. Tillson

(*Eng. and Min. J.* 135: 121-124, March, 1934.)

BEING an industrial disease silicosis has mechanical and physiological causes, developed with scientific and statistical detail by Benjamin F. Tillson, Consulting Engineer, New Jersey, as the third article in the "Silicosis" series. Lodgment of various free silica particles, also those of free silicates, in the lungs initiates the disease process. Sericite, a mineral compound, is more responsible than free silica in causing silicosis, according to the researches of Dr. W. R. Jones, a British geologist who investigated conditions in the South African gold mines, and elsewhere in the Empire.

As a technical engineer Mr. Tillson accumulates facts and statistics, also mathematical calculations, upon mineral particles suspended in the air as bearing on the silicosis problem. Some of these are: the size, shape and specific gravity of dust particles; the velocity, density, humidity, temperature and pressure of the transporting medium. The silica dust found in the lungs varies in size from ½ micron up to 10 microns. Faithful work has been done on these infinitesimals. Dr. Jones has calculated 10 grams of dust extracted from the lungs of a silicosis victim as having had a possible volume of 240 million particles per day over 14 years' exposure. Other calculations offer smaller fractional quantities, as 1/1200 gram, or 83 million particles per day, which proved fatal.

The U. S. Health Service advises a dust content below 10 million particles per cubic foot of air for granite workers, where the quartz content is 35%.

Tables and illustrations assist these explanations. As a slight discouragement to the remedial spraying of dust in mines and factories commonly resorted to by employers in lessening dust hazards, a single South African droplet is reported as carrying over 800 particles, each smaller than two microns each. Worse carrying power was noted from grindstones in Great Britain where droplets of 2 mm. in diameter conveyed 4,383 particles apiece, with 24 microns as maximum dimensions.

The respiratory tract as a ventilating system, the minute structure and physiology of the lungs, their tidal air, receive intensive technical and statistical treatment to prepare the way for the pathology of silicosis in another paper. Phagocytic functions and the ciliary defenses of the system show nature's determined efforts to rid the system of these invading dusts.

Pneumonoconiosis

Paul A. Quaintance *and* F. J. Morris

(*Calif. & West. Med.* 40: 337-340, May, 1934.)

A STUDY of 58 pottery workers has been made by Drs. Paul A. Quaintance and F. J. Morris of Los Angeles, an award of total and permanent disability to a worker who had derived his ailment during 24 years in the industry, prompting the study. Pneumonoconiosis is defined as a fibrosis of the lungs due to repeated inhalation of silica-laden air.

The authors review the literature, beginning with the Italian Ramazzini, who, in the early 18th Century, described the grating sounds produced in cutting the postmortem lung tissues of stone and coal workers. Various contributions to the pathogenesis are also reviewed, together with the classic symptoms. The industrial plant manufactured bathroom ware exclusively, using a silica content approximately 25%. The processes resulting in silica dust were detailed. The dust was constantly inhaled, no masks were worn, there was no forced ventilation system and only occasional sprinkling. Ware broken in the first firing was crushed and re-ground, constituting an extra silicosis hazard. Of the 106 employees 58 in varying percent and different stages of pneumonoconiosis were carefully studied. No tuberculosis was found in the group.

On an average exposure of 16 years 8.6% had advanced fibrosis; 38% had second stage or moderate fibrosis, while 53.4% had only slight fibrosis. In another study of 58 potters made by Pancoast and Pendergass much higher percentages occurred but were not used here for comparison for lack of stating the time of exposure.

The test case, given in essential findings, involved a potter who had worked 24 years and was 54 years old. Another case, aged 43, of a caster for 12 years ended fatally after catching cold at his work. X-ray pictures of the two cases are given, and fibrosis sections representing the three stages of the disease.

The author emphasized prevention of inhalation and reduction in concentration of silica-laden air as the duty of industries concerned, state legislatures and the medical profession. The California Appellate and Supreme Court concur in awarding total and permanent disability pensions to pneumonoconiosis victims. The "date of injury" is defined as the time of onset of

symptoms or the time when medical examination could reasonably have determined the disease. Where more than one compensation insurance carrier is concerned the Industrial Accident Commission apportions the liability compensation according to the duration of employment under each or as equitable under periods of insurance coverage.

Roentgenological Considerations of Silicosis

SIMON A. LEVEY

(*J. Missouri M. A.* 31: 189-193, May, 1934.)

NO DIAGNOSIS of silicosis can be properly made without roentgen ray examination, but, except in advanced stages, the roentgen examination alone will not suffice. Dr. Simon A. Levey, St. Louis, derives these principles while detailing the pathology of silicosis lungs. He submits five roentgenograms of the three stages of simple silicosis together with advanced silicosis on which tuberculosis is superimposed. Every later stage intensifies the character of the previous one, though the tubercular signs when beginning somewhat mask the silicosis.

The initial process concerns the extremely fine silica dust particles which pass the cleaning mechanism of the respiratory passages and are deposited in the lymphatics around the small bronchioles. Due to irritation mechanical or chemical, from partial solution of the silica involved, a fibroblastic reaction occurs, resulting in a wall of hyaline fibrous tissue. This surrounds the dust particles and forms nodules. They stud the trachebronchial glands, then the pleura and finally the lung substance. As the disease progresses, the nodules grow larger and coalesce. If tuberculosis sets in the nodules become more fibrous, grow more rapidly and often show central necrosis.

Directions for taking the roentgen pictures and how to read them relative to stages of the disease, are important in this paper, together with clinical comments interspersed. The roentgen changes constantly accompany the symptomology. The tuberculous signs, though typical, are often confined to the upper lobes and may obscure the evidence of advanced silicosis. At the same time the silicotic progress sometimes slows down the tubercular. The prognosis is poor for both reasons.

The industrial hazards of silicosis are worldwide. England's campaign against silicious dust has gone ahead of our attempts at corective conditions. The insidious onset and high mortality make preventive measures imperative. No less indispensable are the roentgen revelations in the detection and treatment of silica dust invasion.

Silicosis and Its Relationship to Tuberculosis

LEROY U. GARDNER

(*Am. Rev. Tuberc.* 29: 1-7, Jan., 1934.)

SILICOSIS is a pneumonoconiosis brought about by inhaling silica dust. It specifically predisposes to infection with the tubercle bacillus, unlike almost all other dusts.

Industrial populations are widely affected by silicosis, and this prevalence and economic importance have recently produced damage suits all over the country, many fraudulent claims among them. Reputable doctors, especially tuberculosis experts, are likely to be asked to diagnose and testify with increasing frequency, in the opinion of Leroy U. Gardner, Saranac Laboratory. Hence this informative study.

Silicosis diagnosis is established by a history of exposure to the inhalation of silica dust in occupation, by roentgenological examination and by physical examination.

The finer the dust the more will be inhaled. The minimum dosage is not known, but the condition is progressive and symptoms of the disease may appear years after the worker has discontinued the exposure. An ideal case history would list every occupation since the worker left school, the time and duration of his dust exposure, its atmospheric concentration and the size and distribution of its particles.

The roentgen examination requires good films, expert knowledge and experience. A tuberculosis expert reading silicosis plates would observe the pneumonoconiosis signs and, after consultation and study, acquire knowledge of its type and degree. Physical signs of pulmonary infection are few and seem insignificant unless the silicosis shows complication by infection.

The process sequence takes the inhaled particles to the alveolar ducts and the alveoli leading from them where phagocytes ingest them. Pulmonary units just underneath the pleura are more heavily involved at first. The phagocytes accumulate within the lumina of these air spaces, multiply and fuse into compact plaques. The toxic silica injures some cells and polymorphonuclear leucocytes are attracted. Adjacent walls of the air spaces thicken owing to proliferation

of histiocytic cells, the progenitors of more phagocytes. This is a non-specific response developing as a feature of the reaction to most kinds of inhaled dust. When the particles are transported by the phagocytes to the vicinity of the lymphoid tissues, the characteristic lesion of silicosis appears. A compact nodule, a "pseudotubercle" forms around lymphoid tissue as center. The development into a fibrosis is carefully detailed.

Readings of the roentgenogram at this stage interpret the changes that have gone on in forming individual nodules. When these increase in number and size they may be too numerous to permit penetration of the x-ray. Confluent lesions localizing should arouse suspicion of a complicating infection.

A quickly developing silicosis after relatively short exposures to heavy concentrations of silica may imply a previous exposure further back or else a tuberculosis complication. The histological processes for this speedy silicosis are described in detail. Tubercle bacilli have not been found at all or are very rare, though typical caseous tubercles have been found here and sometimes a diffuse pneumonic exudate exists.

Tuberculosis may appear at any stage of silicosis, but is more frequent in advanced stages; 75% of patients who have silicosis die of tuberculosis. It may be latent when the worker begins his dust exposure or may develop years later.

In animal experiments partly healed primary foci of tuberculosis may be re-activated by silica inhalation. Serial roentgenograms of human beings show re-activation of latent apical tuberculosis in a similar manner. When the infection is acquired in the occupational silicosis, it is thought to affect the middle or lower lung rather than the apex.

The modifications produced in the characteristic lesion of silicosis by an active tuberculous focus in the lung are described in detail, likewise changes recorded in the roentgen pictures. Certain theoretical and practical questions are shown dependent on the relation between silicosis and tuberculosis. Their combination is not considered by this author as a superimposition of one on the other or as merely a combination.

Typhoid Fever in Industry

DURING the past decade or two, many industries have moved their factories and other institutions to suburban areas for reasons of economy, and this movement has carried countless thousands of employees from the protection of the city to homes in small communities where the control of typhoid may be considerably less efficient.

At the same time, many city dwellers employed by industry have been enabled through the availability of the automobile, privately owned, and by the extension of transportation systems into the rural district, to move into the suburban or rural district and establish homes, while they make their regular trips into the city to serve industry. The factory or other industrial institution may be adequately protected from typhoid infection as regards the milk and water used, but it is impossible for the industrial physician to know what goes on in the private home or community where the employee lives. If the worker becomes infected at home and brings the disease into the plant it may result in a serious epidemic. This is particularly true in food factories or in plants where food products are distributed.

Typhoid fever now belongs to the group of rather uncommon diseases in which the diagnosis must be confirmed and the health officer must participate in the management of individual cases. It appears that other members of the household are less apt to contract typhoid fever when the primary case is moved to a hospital, and that when the patient remains at home fewer secondary cases occur in large than in small communities. Under special and emergency conditions, typhoid vaccination is a useful and necessary procedure, but its employment as a permanent control measure in civil population groups is of doubtful value.

The general strategy of combating typhoid fever at the present time seems clear. It consists essentially in putting into practice the knowledge we already possess. So far as possible, the program of the industrial physician is to tighten and strengthen the barriers that prevent typhoid bacilli from getting into drinking water and foods. Second, in those communities where typhoid has already been reduced to a low point by the application of such measures, the physician should investigate the source of each case reported among the employees, and concentrate on the elimination of case infection, and especially carrier infection, working in cooperation with the local and state health officers. The successful methods now used in the combat against typhoid if continued at their present satisfactory rate indicate that the complete eradication of typhoid is an actual possibility, and is the goal toward which future preventive efforts should be directed.

The Medical Department Manual

—The Complete Handbook of Organization, Operation and Routines Representing Actual Experience and Practice of 20 Years—

by

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SECTIONS previously published: I. History of the Medical Department (*January*); II. Physical Property; III. Personnel (*February*); IV. Functions and Routines; V. The Centralized Medical Department; VI. Subjective and Objective Relations; VII. Research (*March*); VIII. Forms (*April*); IX. General Instructions to Examining Surgeons; X. Classifications of Physical Defects; XI. Classifications for the Reviewing Surgeon (*May*).

Section in This Issue: XII. Regulations and Requirements Governing Physical Examinations; XIII. Interpretation of Physical Defects of Employees for Department Executives.

Sections in Subsequent Issues: XIV. Requirements of a Course of Industrial Medicine and Surgery; XV. First Aid; XVI. Sanitation; XVII. The Nurse; XVIII. Industrial Medicine and Surgery; Its Past and Present Status; XIX. How the Medical Department Can Be a Factor in the Reduction of Absenteeism.

XII. Regulations and Requirements, Physical Examinations

APPLICANTS for employment must pass satisfactory physical examination before entering service, this examination to include that of sight, hearing and physical condition. Applicants for positions requiring the interpretation of colors must pass a satisfactory test for color perception.

2. Applicants and employees who are to be examined will be sent to the physician designated for this work and will carry with them the physical examination record and an envelope, addressed to the department official requesting the examination, for return of the examination record.

3. To prevent substitution and fraud, the applicant or employee will sign his name before the department official on the physical examination record and will be requested to sign again on the record before the examining physician. Comparison of signatures is most essential.

4. Proper records of all physical examinations shall be carefully maintained.

5. Examinations and re-examinations may be ordered at any time by proper authority. No applicant will be allowed to present himself before the examining physician without the necessary department official's order.

6. Physical examinations shall not be made immediately following subjection to unusual fatigue.

7. When an applicant has been found by the examining physician to have physical defects, the doctor must not be requested to re-examine the applicant until the reviewing surgeon for the company has passed on his condition.

8. Employees, who by reason of any physical condition may become a menace to the public, to their fellow employees, or to themselves, must pass a satisfactory examination physically, including sight, hearing and color sense, and must be re-examined at stated intervals as the individual case may require.

9. Employees who have physical defects that may cause sudden incapacity shall be examined at such intervals as may be determined by the reviewing physician.

10. All employees mentioned in Rules 8 and 9, who, upon examination, register a blood pressure of over 145 will be maintained under close observation, and it is recommended that all employees having a blood pressure over 200 be held out of service pending further investigation.

11. All employees who are to be transferred from one class of work to another class, or who are to be promoted to a more responsible position, should be examined before being permitted to assume their new work.

12. Employees who have been on any extended leave of absence from the company should be examined before being permitted to resume their regular work.

13. Employees who have been disabled by reason of accident or disease which predisposes them to sudden incapacity, or whose sight or hearing may have thereby become affected, must pass a medical examination before returning to duty.

14. In order to prevent undue hardship to any employee in service, and recognizing the in-

creased value of such an employee bcause of his experience and familiarity with duties to be performed, the causes of rejection as given herein shall not apply either in re-examination or examination for promotion, except in so far as a disability found may interfere with the safety of the public, or endanger fellow employees, or possibly result in injury or loss of efficiency of the employee so examined.

INTERPRETATION OF THE REVIEWING SURGEON'S REPORT:

1. Applicants who are designated as APPROVED FOR EMPLOYMENT will be accepted into the company as physically fit for the position applied for, and meet the standard of requirements in the classification set down for the work they are to perform.

2. The acceptance of applicants who are designated as APPROVED FOR EMPLOYMENT CONDITIONALLY is contingent upon their having the defects found at examination corrected within a reasonable time. The correction of such defects will then be evidence that they are physically fit and comply with the standards of the position applied for.

3. If applicants who come under Par. 1 are employed, the department official will sign the medical examination form and attach it to the second copy of the payroll advice.

4. Applicants who come under Par. 2, if employed, will be added to the temporary payroll until approved by the employment department, when they may be put on the regular payroll.

5. Applicants who are designated as DISAPPROVED FOR EMPLOYMENT will not be employed. If there is any doubt as to the examination, same must be referred to the Reviewing Surgeon.

APPROVED FOR EMPLOYMENT:

Physically fit for the position applied for.

APPROVED FOR EMPLOYMENT CONDITIONALLY:

Physical conditions to be corrected. When this is accomplished, applicant becomes physically fit for the position applied for.

Overweight or underweight. (Within a reasonable therapeutic limit).

Increased temperature 99. (Which cannot be accounted for).

Vision that can be corrected with glasses. (To conform to standard).

Defects in hearing. (Which can be corrected to standard).

Nasal defects. (Correctable by treatment or operation).

Tonsils. (Diseased, corrected by operation).

Halitosis. (Offensive breath that can be corrected).

Heart conditions that are amenable to treatment. (Compensated).

Lung conditions. (That are amenable to treatment).

Blood pressure, high or low. (Not of organic nature).

Varicocele, hemorrhoids. (Which can be corrected).

Skin rashes that are curable. (Not infectious or contagious).

Vaccination. (Unless patient objects to same, refer to doctor).

Flat feet. (Depending on what degree and if the applicant is required to be on feet a great deal).

Varicose veins of limbs. (Depending on what degree and if the applicant is on feet or not, at his work).

Other conditions that are correctable and not included here.

DISAPPROVED FOR EMPLOYMENT:

Applicants marked as disapproved are physically unfit for the position applied for and do not come up to the standard as outlined in the classification for employment:

Great or excessive overweight; excessive underweight.

Defective eyesight that cannot be corrected. (Which defect will be increased by an eye injury).

Defects in eyeball itself. (Cataracts, corneal opacities, and other defects).

Deformities of the visual apparatus.

Argyall Robertson pupil.

HEART:

Valvular disease.

Tachycardia (Rapid heart).

Arrythmea (Irregular heart).

High blood pressure.

Hypocardial or endocardial disease.

LUNGS:

Tuberculosis (Consumption).

Emphysema (Enlarged air space in lungs).

Asthma.

Chronic bronchitis.

Evidences of extensive lung changes due to previous disease.

HERNIA:

(Rupture).

Inguinal (Groin)

Umbilical (Navel). All ruptures are disapproved.

Femoral (Below groin). With or without trusses.
Scrotal (In scrotum). All operative wound herniae disbarred.

LIMBS:
Amputations of.
contractures (that will be conducive to accident or inefficiency).
Enlargements and atrophies of.
Flat feet, third degree.
Varicosities.
Presence of bone tumors.
Ankylosed joints.
Marked deformities of.
Loss of more than two fingers on hand.

BLOOD VESSELS:
Arterio-sclerosis (Hardening of the arteries).
Varicose veins.
Aneurism (High blood pressure).

GENITALS:
Orchitis (Inflammation of testicles).
Epididymitis (Inflammation of cord).
Varicocele (Varicose veins in scrotum).
Any venereal disease.

SPINAL:
Tabes (Locomotor ataxia).
Marked spinal curvatures (Hunchback).
Multiple sclerosis.
Multiple neuritis.
Paralysis.
Fixed spine.

GENERAL:
Rheumatism or arthritis.
Nephritis (Bright's disease).
Diabetes.
Alcoholism.
Exophthalmic or toxic goiter.
Narcotism (Drug addict).
Syphilis (Any stage).
Gonorrhea.
Skull Fracture (Evidence of old injury).

DEFORMITIES:
Atrophies (Wasting).
Hypertropies (Enlargements).
Contractures.
Curvatures.

MENTALITY AND NERVOUSNESS:
High degree of Nervousness.
Disordered mentality.
Insanity.
Dementia.
Hysteria.
Epilepsy.

MISCELLANEOUS:
Any chronic disease that will impair the health and efficiency of the applicant, as gastric, renal, hepatic, gall bladder and splenic disease.
Infectious or contagious diseases.
Facial disfigurements, if repulsive.
Defective teeth with pyorrhea and evidence of chronic pus absorption.
Feebleness.
Applicants with evidence of many operations and operative hernia.
In female, any chronic pelvic disease.

HEARING:
Disease of middle ear.
Deafness, partial or complete.

COLOR SENSE:
If position calls for interpretation of color signals, any degree of color sense or color ignorance will bar from employment.

NOSE AND THROAT:
Chronic rhinitis, sinusitis or pharyngitis.
Ozena.
Infectious and contagious diseases.
Tumors and cancers.

Conclusion

THE foregoing should apply to female employees the same as to male employees. The employing officer should select with care the prospective employee and avoid sending to the doctor a man whose appearance shows he is unfit for service in the company. This saves the time of the doctor and the applicant, and at the same time, saves the expense of the examination.

In order to avoid and prevent fraud by the employee in subsequent claims for personal injury, a careful record must be made and kept available of the physical defects of employees which do not impair the usefulness of the employee, but which might be aggravated by the service, or injury, and which might contribute to the prolongation of disability in case of injury.

Competent physical examination of employees at the time of entrance into service, and periodic medical surveys of the employees at regular intervals of at least every two years, will be conducive to reduction of accidents and labor turnover. It will also uncover incipient disease in time to effect a recovery in most cases, and will reduce the time of convalescence following injury.

The most exacting cooperation is essential between the medical officer and the department officials in order that the greatest good shall result from this work.

XIII. Interpretation for Department Executives

MANY times employing officers and departmental officials are at a loss to know how to interpret the various defects which may be found in an applicant for employment, and this interpretation has been compiled for the purpose of explaining why such defects in an employee are a hazard from a medical standpoint.

As the examining doctor will record on the examination report only the physical defects that have been found in an applicant, the employing officer will use this as a guide as to why certain defects would disbar the applicant for a given position. The employing officer, upon receipt of the doctor's report of the applicant's examination, will forward the same to the reviewing surgeon, who will advise if the applicant is to be accepted or rejected.

Defective Vision:

It would not be a safe or practical act to place a man with defective vision in a position where there was a hazard of flying chips of steel or other objects where injury to already defective vision might result in blindness. The wearing of glasses often works a hardship on the worker who, in such an occupation, must wear protective goggles.

An employee whose work requires close and constant visual attention is handicapped if his vision is defective, and eyestrain is increased.

You must always bear in mind the fact that glasses are a hazard to a man working in a shop around machinery.

Glasses are often lost or left at home and the employee is lost without them. Fogging of glasses from perspiration is frequently the cause of injury.

If one eye is good and the other very defective, and one eye is injured, often serious results are had, as frequently the good eye is the one injured. The defective eye, injured, often results in further defect, or there is a sympathetic opthalmis in the good eye if the poor one is injured.

Eyestrain caused by defective eyes is often the cause of nervousness and headaches which cause the employee to be irritable in nature, and his mind is often diverted from his work, frequently resulting in accidents.

Eyes having evidences of previous injury, as slight scars on the cornea or opacitis, may lead to a serious result to the injured eye in a future injury.

Perfect eyesight is essential in those driving vehicles, cranes or trains, and it is necessary that they have clear, unobstructed vision in order to avoid accidents, whether on private rights-of-way or public highways.

Defective Color Perception:

It is needless to dispute the fact that an employee whose work requires that he have to interpret various colors, must have perfect color vision. Even color ignorance is a hazard in this class of work.

Color-blindness developing in employees is a symptom of some grave constitutional disease present.

This is not so in the congenital type, but in the acquired type only.

Defective Hearing:

A man with defective hearing is very prone to be injured by his failing properly to interpret orders or heed warning calls.

A man with defective hearing is very liable to become morose and irritable by reason of the fact that he cannot hear what is going on about him; and he thinks his fellow workers are taking advantage of his deafness.

Many accidents that occur, especially around moving machinery, could be avoided if the employee were not deaf, as he would have been able to foresee the accident by hearing some unusual noise about his machine.

An employee who is deaf usually speaks in a loud voice, and his sudden speaking to a fellow worker in this unusually loud tone will startle the man and cause him to act quickly, with injury resulting.

All drivers of moving vehicles should have perfect hearing, as this is essential to safety.

Deaf employees who come in contact with the public are often the cause of misunderstanding in conversation, and are very annoying to those seeking information, etc.

Defective hearing often is the manifestation of some constitutional disease; the case of slight hard-of-hearing frequently goes on to complete deafness.

Halitosis:

This condition is often the sign of organic or constitutional disease, and, especially if ozena is present, the offensiveness of the breath will be very annoying to shop and office workers. If the victim comes in contact with the public, it is the source of unpleasantness both for the public and the company.

Defective Hearts:

An employee with a defective heart is very

apt to have an attack of weakness when the work he is doing calls for perfect control of all his faculties.

Any strenuous effort, such as lifting heavy objects, going up and down stairs, work requiring long hours, exposure to either excess of hot or cold weather or working environment, and the liability of coming into contact with electric current or gas fumes, are all contra-indications as to placing a man with a weak heart in any such position.

Defective hearts may cause dyspnosa, or shortness of breath, on slight effort. This causes inefficiency on the part of the employee.

The condition stated is the cause of absence from work and is a hazard and constant drain on any insurance benefit.

If disease results in a patient with a defective heart, the risk is greater and the chances of his recovery are menaced.

Any work requiring continuous effort without opportunity of rest is contra-indicated as to men with defective hearts.

HIGH BLOOD PRESSURE:

All men over 45 years of age should have their blood pressure taken, as this is often the first indication that grave disease is impending.

Men with high blood pressure are prone to have attacks of light-headedness and dizziness, and if they are on ladders or scaffolding, or about moving machinery, they are liable to be injured while in these attacks.

Laborious and continuous physical effort will induce rupture of blood vessels, with resulting apoplexy.

These men are poor insurance risks. Their blood pressure is the sign of a diseased heart, kidney disease, and other conditions that will often cause absence from work.

Anything that will cause worry or increase their emotions will often cause the stroke that is impending.

LOW BLOOD PRESSURE:

This condition is the forerunner of more serious constitutional diseases and unfits the worker to discharge his work either efficiently or safely. It has the possibilities of the employee having frequent spells of illness with absence from work. Indicates a poor insurance risk.

INCREASED TEMPERATURE:

The increased temperature above 98.6, if constant, is always very suspicious of tuberculosis and many other diseases. It means that this man will be a poor insurance risk, will be ill often, and infficient at his work on account of the disease suffered from, and is often the first notice of a chronic and long lasting illness.

An employee with this condition should never be placed at work in a cold, damp or wet place, or where he would be liable to inhale dust, smoke or gaseous fumes that would irritate his lungs.

He would not be able to do work requiring prolonged physical effort, or to do heavy strenuous work of any nature.

DEFECTIVE LUNGS: (Respiratory Diseases).

It is needless to go into the details of the hazards of employing men with defective lungs, as they are poor insurance risks, are frequently absent on account of illness, and are inefficient in their work, as they are weakened by their diseased lungs.

They are a menace to their fellow-workers, on account of the danger of transmitting their disease to an otherwise healthy employee. They cannot be exposed to extremes of hot or cold, or to wet or damp places, or where smoke, gas or dust is present. They are unable to do work requiring moderate effort. They are a risk to their fellow-workers on account of their lack of strength, as they often let go of their end of the load, and the other man is injured.

HERNIA:

The man with a hernia is the greatest risk in industry today. This is true even if the hernia is controlled with a truss.

The man with a rupture is unable to do heavy lifting or strenuous work without causing the hernia to become aggravated, with the resulting claim for damages.

Any injury or aggravation, no matter how trivial, makes the company liable before the compensation board.

If you have the hernia operated, the employee will invariably make use of alleged weakness or pain in the locality, if he does not like the work to which he is assigned.

The danger of strangulation of hernia is very great, either with or without a truss.

Sudden attacks of weakness and pain during lifting cause the man to drop his work, with a possibility of injuring himself or his fellow-worker.

The mind of an employee with a hernia is diverted by reason of the discomfort that is present on effort, and he is inefficient and a constant menace to himself as well as to those about him.

Such a man complains of backaches and pains down the legs, and he is often unable to work, and absent from work.

When an employee with a hernia fails to do

his share of the work alloted, the other employees' morale is lowered and they rightfully have grievances. This applies to women as well as men.

Many cases of hernia develop at home and the company is obliged to buy the hernia and pay the expenses of correcting it.

From a sick benefit standpoint, hernias are a constant drain on the funds.

Varicose Veins:

In legs or scrotum this condition is one fruitful of accident-making, on account of the pain or discomfort caused by heavy and continuous work. When these men are obliged to remain on their feet for long periods at a time, the condition is aggravated. Their minds are diverted from their work, and as a result they are inefficient or are injured.

A lineman who is obliged to wear spurs with the straps about the limbs should be free from varicose veins of the legs, as the constriction causes an increased severity in this condition.

Liability of injury to the lower leg is frequent, and if varicose veins are present this injury, otherwise trivial, becomes a serious and prolonged one. Ulcers develop from trivial bruising of the legs, and are re-occuring.

Often absence from work and inability to do a full share of work is due to this condition.

If the work contemplated does not require long periods of standing, and if employees are off their feet, be sure that liability of injury to the lower leg is not overlooked in the placement of employees.

If the varicose veins are in the scrotum, there is the danger of aggravation of the condition on trivial effort, with the resultant claim for compensation.

There is also the diverting factor here to deal with, as the mind is taken from the work, and an accident is at hand.

Flat Feet:

Here there is the same thing to contend with as in varicose veins and hernia: aggravation of condition by trivial accidents, with claim for compensation.

Pains in feet and legs are diverting factors of mind that cause accidents. These men are inefficient in their work and have sudden attacks of pain; let go their end of the load, with an accident often resulting.

Pains and condition aggravated by increased weight lifting or being on the feet for long periods of time.

If injury to the feet occurs, there is often a disabling condition resulting that would not have been the rule if the feet had been normal.

Defective Teeth and Tonsils:

These two conditions will be treated together, as what is given applies to both conditions.

The largest percentage of claims coming before the compensation board are for disabilities resulting from defective teeth or tonsils, and not from injuries claimed to have been received.

These conditions cause changes in the joints of the extremities and in the spine, long before an injury results from an accident. Then when an injury results, which may be a trifling one, the patient is disabled out of all proportion to the traumatism inflicted. These diseased organs have thrown their infective material, or toxines, into the blood and they are carried to the joints and an arthritis develops, or other bone changes result. This is known as focal infection, and is a costly one for both the claim department and the insurance fund.

Diseased tonsils cause what is known as arthritis, neuritis, so-called rheumatism, lowered vitality, and respiratory diseases, and are one of the most prevalent causes of defective heart.

Diseased teeth and pyorrhea of the gums are causative factors in all of the above conditions, the same as diseased tonsils.

In addition, many so-called cases of stomach trouble are caused by diseased teeth. Even cancer has been caused by the irritation of the mucous membranes of the mouth by a sharp and ragged tooth over a long period of time.

Foul breath, with its unpleasant sequel, is often the result of poor, diseased teeth.

These conditions are causative of more cases of absence from work than any other two conditions. The so-called head colds are due to infection resulting from lowered vitality caused by the constant poisoning from defective teeth and tonsils.

Diabetes and Nephritis:

These two conditions, the one, sugar in the urine from a diseased pancreas, and the other, inflammation of the kidneys, are shown by albumin in the urine.

Both of these diseases result fatally in a large percentage of cases, and sufferers from them are constantly absent from work on account of illness, are inefficient when on the job, and are a menace to both themselves and their fellow employees on account of their illness and the resultant hazard of causing accidents. They are poor insurance risks. Their length of service with the company will not warrant the cost of training or breaking them into the work. If in-

jured, the outcome is very doubtful on account of their illness, and death often results from the disease becoming aggravated in a trivial injury.

VENEREAL DISEASE:

As to any active venereal disease, it is poor practice to take such hazards into your service. They are liable to infect their fellow-workers. Many times their diseases are progressive, and this means absence from the job. If injured their convalescence is retarded and results are not as favorable as if these diseases were not present.

If the patient is not in the infective state of gonorrhea, or is cured, this should not be held against him, except as to what might develop from subsequent injury.

If syphilis is present in any stage, it is contra-indicative to any employment on account of the liability of future disability, either from the progression of the disease, or from the complications resulting from some injury received.

The danger of insanity is marked in this disease, and in view of the valuable nature of your property and the hazards of your products, you cannot afford to take any risk of placing in position anyone predisposed to insanity.

CONCLUSION:

It is hoped that from the foregoing interpretation the departmental officials and employing officers will be able to interpret the hazards in certain physical defects.

Programs of Interest

An Unusual Group of Meetings, Providing Important Material to be Abstracted in Later Issues.

DURING May and June an unusual group of meetings are being held in various parts of the country which will attract wide interest because of the important material presented. An outline of these meetings will be given at this time, with the probability that considerable of the information presented will be abstracted in later issues.

Illinois State Medical Society

AT THE eighty-fourth Annual Meeting of the Illinois State Medical Society at Springfield on May 15, 1934, the sections on Public Health, on Medicine, and on Radiology, held a joint session sponsoring a symposium on pneumoconiosis. Dr. Frank Jirka, director of the State Department of Health, gave a paper on "The Function of the State Department of Health in the Control of Pneumoconiosis"; Dr. C. O. Sappington, of Chicago, presented material on "Laboratory Methods for Determining Atmospheric Pollution Causing Pneumoconiosis"; Dr. Jerome R. Head, of Chicago, read a paper on "Clinical Findings in Pneumoconiosis"; Dr. Richard H. Jaffe gave a talk on "Pathology in Pneumoconiosis"; and Dr. F. Flinn, of Decatur, presented material concerning "Radiographic Visualization of Fibrosis Produced by Dust Iinhalation."

Central States Society

AT THE Annual Meeting of the Central States Society of Industrial Medicine and Surgery, Springfield, Illinois, May 15, 1934, there was a symposium on silicosis.

Dr. W. D. McNally, of Chicago, covered the general aspects of the subject; Dr. C. E. Cook, of Chicago, presented material concerning the roentgenological features, Dr. J. J. Moore, of Chicago, emphasized the pathological aspects; and Dr. Lloyd Arnold, of Chicago, presented a talk regarding the use of preventive measures.

West Virginia Medical

THE Section on Internal Medicine of the West Virginia State Medical Association, at the sixty-seventh Annual Meeting, Huntington, W.Va., May 14-16, 1934, had two papers of interest to readers of *Industrial Medicine*. The first was "Silicosis and Other Pulmonary Conditions Resulting from Inhalation of Dust," by Dr. Albert E. Russell, U. S. Public Health Service, Knoxville, Tenn., the second, "Common Non-Tuberculous Pulmonary Diseases," by Dr. G. E. Gwinn, of Beckley, Tenn.

Industrial Physicians and Surgeons

THE 19TH Annual Convention of the American Association of Industrial Physicians and Surgeons will be held on Monday, June 11, and Tuesday, June 12th, 1934, at Cleveland, Ohio.

On Monday afternoon, June 11, at 2 P.M. there will be a symposium on silicosis. Dr. Emery R. Hayhurst will cover "Occurrence, Etiology, X-ray and Clinical Findings and Prognosis." Dr. R. C. McKay will discuss the "Relationship of Silicosis to the Tuberculosis Problem." Dr. C. O. Sappington will present material on "Some Medicolegal Phases."

Midwest Safety Conference

ON THURSDAY, May 10, 1934, as a part of the Twelfth Annual Midwest Safety Conference, a section on Dust in Industry was held.

Contributing to the program were Dr. James T. Case, of Chicago, who spoke on "The Use and Abuse of the X-ray Examination in Certain Indutrial Diseases"; J. J. Bloomfield, of Washington, D.C., who presented material on "The Determination and Control of Industrial Dust"; and Thomas C. Angerstein, of Chicago, who talked on "What Does Illinois Need in Occupational Diseases Legislation?"

American Medical Association

THE eighty-fifth annual session of the American Medical Association will take place at Cleveland during the week of June 11, 1934, the section meetings occurring on Wednesday, Thursday and Friday of that week.

Of particular interest to industrial physicians and surgeons will be the two sessions of the Section on Preventive and Industrial Medicine and Public Health, held Wednesday afternoon, June 13th, and Thursday afternoon, June 14th, at 2 P.M.

The Wednesday afternoon meeting will consist of the following preliminary program: "Epidemiology of Lead Poisoning," by Dr. A. J. Lanza, of New York; "Chemistry of Lead in the Body," by Dr. Joseph C. Aub, of Boston; "Normal Absorption and Excretion of Lead," by Robert A. Kehoe, of Cincinnati; "Symptoms in Early Stages of Lead Poisoning," by Dr. R. R. Jones, of Washington, D. C.; "Control of Lead Poisoning in the Worker," by Dr. Elston L. Belknap, of Milwaukee; and "Recent Progress in the Treatment of Plumbism," by Dr. Irving Gray, of Brooklyn.

The Thursday afternoon meeting shows the following subjects and speakers: "The Relation of Postgraduate Medical Instruction to Public Health," by Dr. Leroy E. Parkins, of Boston; "The Response of Peritoneal Tissue to Dusts Introduced as Foreign Bodies," by Drs. John W. Miller, R. R. Sayers, and William P. Yant; "The Estimation of Functional Disability in the Pulmonary Fibroses," by Drs. A. Hurtado, W. W. Fray, N. Kaltreider, William S. McCann of Rochester, N.Y.; "The Control of Occupational Diseases by Laboratory Methods," by Dr. C. O. Sappington, of Chicago; "Carbon Tetrachloride as an Industrial Hazard," by Dr. P. A. Davis, of Akron, Ohio; "The Effects of Consolidation of State Health, Welfare and Licensure Functions to Preventive Medicine," by Dr. F. D. Stricker, of Portland, Ore., and "Some Phases of Current Medical Relief Problems," by D. H. Jackson Davis, of Albany, N.Y.

Industrial Eye Accidents in England

EVERY year nearly 7,000 men in Great Britain's industries sustain eye injuries of more or less serious nature. It is computed that some 4,800 eye injuries involved a seven-day absence from work, or more, while, for 4,300, the average absence was four weeks. Nearly all of these accidents could be avoided, according to a brief article in *Industrial Welfare* (London), May, 1933, if the proper protective devices—goggles with non-shatterable lenses and machine guards — were used and the use enforced. The Committee on the Causes and Prevention of Blindness refutes the erroneous idea that goggles are in any way injurious to the sight, and suggests that specifications for goggles to be worn at hazardous types of work in mines and in the engineering and metal trades be drawn up by the Home Office.

Bakers' Eczema

VAN VONNO and Struycken point out that in spite of a decreased consumption of flour and bread, bakers' eczema is increasing. They think that this incongruence can be explained by the increase in allergic disorders. Because some investigators have ascribed the recent increase in bakers' eczema to the substances that are added to the flour to make it more suitable for baking, they made tests on bakers with and without eczema and on control persons. In experiments with various types of wheat, rye and rice flours, they gained the impression that one of the main causes of pre-disposition to eczema must exist in wheat flour. They made tests with various substances that are added to the flour to make it more suitable, but they reached the conclusion that these substances, particularly ammonium persulphate, are not responsible. In discussing the treatment, they point out that some advise a change of occupation for bakers who are subject to eczema; but since this is not always possible, they recommend tests to determine to what type of flour the patient is susceptible, and, after the eczema has been cured, desensitization treatment. They call attention to errors and wrong conclusions in the studies of the investigators who considered the addition of ammonium persulphate as the main cause of bakers' eczema, and point out that bakers' eczema was known long before this substance or any other was ever added to the flour.—*J.A.M.A.* 101:963, (September 16, 1933).

Workmen's Compensation

—A Complete Study of the Subject with Special Reference to its Medicolegal Aspects—

by

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XVII. Government

AS WE use the term government in its generally accepted sense, we think of the laying down of rules and laws which the body politic is obliged to observe. Yet government *is* the body politic; especially in our country, that of a representative body, the sovereignty rests in the people. When Workmen's Compensation was born to the social order, the mode of its application and the superior authority announcing it were somewhat different from those of our political system.

Workmen's Compensation is a part of a highly socialistic program and has become deeply rooted in our industrial and social life. But industry has not yet become completely socialized. Therefore we have a highly developed social undertaking inserted into a part of an industrial order, which is no doubt responsible for the failure of the full and complete harmony which should prevail.

Is is idle to refuse to agree that capital controls politics and politics make our laws. Evidence of purchasing governmental positions has come to our attention very often, especially in recent years. Legislators are too frequently without understanding of the effect of legislation which they support. We have gone far beyond the normal limit of practical legislation, and the old axiom "Those are governed best who are governed least" is so deeply buried in political rubbish that even our best political economists seem to have forgotten it. Theoretically, industrial boards and commissions should be completely separate and distinct from politics. In some jurisdictions this has been accomplished. In others their functions have become more and more the playground for pie cutting and pie eating politicians.

The law relating to this branch of the government could be much less complicated; simplification would make for a better and more just application of its principles. This can be accomplished only after the people themselves are fully informed as to its intents and purposes. It will not be accomplished until they are fully and completely informed.

Daily come the inquiries, from those who are otherwise generally well informed, as to some principle of Workmen's Compensation. Employers, physicians, attorneys and employees are constantly at sea because of the many intricacies and technicalities which have shrouded the basic principles so heavily that even the courts are unable to bring back the true intent and purpose.

The employer views the act for the most part as a necessary evil; the public seems to think it has been set up as a sort of benevolent society to which almost anyone may appeal and receive succor at its hands. Even those influential in its administration have at times reached the conclusion that its public interpretation is its purpose.

Viewing it in its fundamental light, it is one of the most progressive of legislative enactments. But it must be kept within the limits of its principles. Besides being surrounded with a marked socialistic atmosphere it is also the essence of sound business, and should be analyzed only from this angle. What socialistic benefits may flow should be secondary to the main import.

As to its being a sound business proposition, let us review the main points: The primary purpose is to indemnify workmen and their dependents for monetary loss sustained by reason of accidental personal injury or death. To cover this purpose, it is generally required that such loss be occasioned by "arising out of and in the course of employment."

No general tax is laid to provide the fund from which the indemnity is paid. The cost is put directly upon the employer by way of a premium. Thus a fund is created—and thus the fund is disbursed. The employer has no voice in selecting to what extent he desires coverage. This is laid down for him. He also has no voice in the manner in which this fund is to be disbursed. This is within the discretion of the disbursing body, controlled in a sense, of course, by statute. But in any event the employer is at the "mercy of Tiberius."

It is to be remembered, however, that the cost

of premium must be included in the operating cost of the employer. It must, therefore, go into the product and be met eventually by the purchaser of the product. And as the employer becomes a consumer he shares in the payment of his own premium and indemnity.

Although this basic principle is simple, the difficulties and technicalities arise because of the many problems that present themselves concerning the collection of premiums and the payment of awards. Many of these would be overcome by a more efficient personnel and the adoption of suggestions made in the chapter on "Society." Thus Workmen's Compensation would include all that it was intended to include, and in addition provide a means for taking care of forced unemployment by reason of disability and old age.

Government is the only means by which such proceedings may be instituted. But government is only a term. The people are and should be the government; if the people are misled, government is misled. Surprising as it may be, the free exercise of the right of suffrage was more common in days past. Because present-day conditions have involved the electorate in thought of personal interest, the mass has suffered. With all of our supposedly advanced standards of education, less thought is given to government than in former years.

The advancement of government is solely dependent upon the individual thought that is devoted to it. When the people turn to *thought* in the interest of good government, political intrigue and cunning will be found in the discard. As far back as 1919, many weaknesses in the practical application of Workmen's Compensation were being pointed out; but the suggestion without the force of an understanding electorate has been, and still is, only a gesture.

By bringing the fundamental principles of Workmen's Compensation to the attention of the public in a manner easily understood, the demands may be made upon those seeking legislative and administrative offices, to set forth clearly and completely their stand upon Workmen's Compensation, because only then will its principles be properly and intelligently practiced and accepted.

XVIII. Liability vs. Compensation

WORKMEN'S Compensation, in fundamental principles, dates from 1870. It is based on a strategic political move made by Bismark, who, at that time, was Prime Minister of Prussia. Bismark was one of the greatest statesmen of the 19th century. He was born in Brandenburg in 1815. After studying law at the Universities of Goettingen and Berlin, he filled important diplomatic positions, was nominated prime minister of Prussia in 1862, and resigned that office in 1890.

After the Franco-Prussian disturbance, Germany was confronted with a great deal of industrial unrest, and the theory of socialistic government was asserting itself. Without waiting for proposals from the populace, Bismark suggested the enactment of a Workmen's Compensation law to encourage the workmen to return to industrial pursuits. The enactment of this law deprived the opposition of its ammunition, and was quickly accepted as a marked advancement by the industrial worker.

From that time the principle has been accepted as valuable, and has been adopted in some form by practically all advanced governments. England's first move in this direction was in 1880 when the English Employers' Liability Acts were passed. The principle was not accepted in the United States until 1906, when, on June 11. Congress passed an Employers' Liability Act which, however, was declared unconstitutional in the Employers' Liability Cases (*Howard* v *R. Co.* 207 U. S. 463).

Another act was passed in 1908, and this was amended in April, 1910, to provide for liability of common carriers engaged in interstate or foreign commerce; and the act required that in cases set up against a common carrier the plaintiff must plead the nature of the commerce.

Employers' liability should be distinguished from workmen's compensation. Although similar, there are marked differences.

Analysis of Legal Principles

A BRIEF review takes us back over the common law principle of tort; the relationship of master and servant; employer and employee. Although a contractual relation, certain obligations are imposed for the non-observance of which an action lies in tort. Thus we have the principles of duty on the part of the master or employer. It is demanded of him that he:

(a) provide safe tools, machinery and places of work; and

(b) a sufficient number of competent fellow servants;

(c) promulgate and secure observance to rules; and

(d) warn of danger.

The servant or employee entering upon his duties:

(a) assumes the risk;

(b) risks the negligence of fellow servants; and

(c) is open to fault on the theory of contributory negligence.

It is obvious that before the era of industrial development accidents resulting in personal injury did not arise often in industry, and that under the economic conditions prevailing at that time the foregoing principles were thoroughly in harmony with justice to both parties.

The development of industry brought with it an increasing number of accidents and personal injuries; and suits on account of them grew in numbers. Generally the employer was in a better position to get and produce his evidence than was the workmen, and the public was not long in recognizing the fact that decisions, though, according to the principles of law, they were just, were really working a hardship and were not morally sustainable. Naturally a certain resentment sprang up, and it was this that Bismark was quick to grasp.

When the employers' liability acts were passed, there was not a thorough understanding of either the economic or moral principles as they had been viewed in Germany; and besides capital in England and the U. S. were distinctly more powerful. This element of influence cannot be truthfully ignored.

Bouvier, in discussing the employers' liability act of 1880 in England, says: "The English Act of 1880 gives to all workmen except domestic and menial servants and seamen a right of action if injured by reason of defective machinery, etc., if the defect was attributable to the negligence of his employer or his agent, to the negligence of his superintendent or one to whom he has given authority over the workmen, to some act or omission by a fellow workman in obedience to the employers by laws, to the particular instruction of one placed in authority over him, or to a fellow workman in charge of any railroad signal, locomotive or train. The act abolishes the fellow servant rule but not the contributory negligence rule. The employer may set up the defense that the workman knew of the defect but did not complain. A contract not to claim compensation under the act is lawful. This question was settled in *Griffiths* v *Earl of Dudley*, 9 Q B D 357."

It is obvious that these acts were passed with the intent to limit the defense of the employer, but in a practical sense they did not increase the rights of the workman. They were, therefore, true to their title, employers' liability acts. Take for instance, the provision by which the English act "gives to all workmen except domestic or menial servants and seamen, a right of action if injured by reason of defective machinery, etc." The main point was that it abolished the fellow servant rule. As to a right of action as to defective machinery, I will point out later how far reaching this provision has become in our present workmen's compensation acts.

Of course the assumption of risk was practically abrogated, but when it was held that a contract not to sue was valid, the practical purpose was quickly restored, for obviously if one agrees not to sue for an injury, he certainly assumes the risk.

The Early Acts

THE FIRST workmen's compensation act passed in England was in 1897. Now we are getting somewhere outside of Germany. Here were provisions which will form the contrast with the employers' liability act.

In certain trades and works the employer was liable for accidental injury arising in the course of employment, whether the employer or his subordinate was guilty of negligence or committed a breach of duty or not.

Note carefully this provision, as it forms the basis for one of the most important questions in our modern statute.

This act was repealed in 1906 by another act which provided for compensation for injury from any accident arising in the course of employment *unless* attributable to the serious or wilful misconduct of the workman. But the exception does not extend to injury resulting in death or serious and permanent disablement. Also certain specified "industrial diseases" in the event of death were privileged to claim by dependents.

Here is the recognition of occupational disease as being compensable.

Our Congress passed compensation acts May 30, 1908, March 4, 1911, and March 11, 1912. These acts, in brief, provided compensation under certain governmental employments.

Inasmuch as the real foundation for such legislation rested in the theory of police power, the states began to inquire into the matter. The states, of course, had different ideas about these principles, just as they had about prohibition.

Now to return for a moment to some of the

principles of the English compensation act of 1897. Contributory negligence, voluntary assumption of a known risk, or negligence of a fellow servant could not be used as a defense. It was also provided that where a principal has engaged a contractor for the work, the act makes the principal liable for compensation. All the different procedures were within the option of the workman:

1. He could sue for damages at common law.
2. He could sue under the provisions of the act of 1880.
3. He could claim compensation under the workmen's compensation act of 1906.

Disputed questions were settled by arbitration or in the county courts. We must keep in mind that there is no general fund provided in these instances from which the compensation is to be paid, and this point will present itself when we discuss the acts as they are now administered.

When the acts were passed in the various states, the first provisions were rather indefinite. They were called workmen's industrial insurance acts. Washington passed its first act in 1911; Massachusetts, Maryland and Ohio in 1912; West Virginia in 1913; New York had previously passed an act.

These acts basically provided a fund against which the claim could be made. Originally there were several ways by which this fund was raised. In some instances, it was paid by the employers, or by the employers and the state, or by the employers and the employees and the state, or by any of them or combinations of them, by paying premiums. The right of trial by jury was eliminated except where the employee was denied compensation of any kind.

Fundamentally the state acts are held constitutional under the exercise of police power for the protection of the peace, safety and general welfare of the public. In some states the fellow servant rule is abrogated; in some the act applies to certain industries or only partially; in some it is modified.

Basic Principles of State Compensation

THE BASIC principles of the acts are the compensation to injured workmen or the dependents of killed workmen if the accident arises out of and in the course of employment. The compensation is paid from a fund, which fund is raised by the payment of premiums. How this fund is raised and disbursed depends upon the jurisdiction. Some acts provide for the administration by boards of arbitration, others by boards of award and still others by industrial commissions.

The early difficulties in Ohio arose mostly by reason of the opposition of the employers and the insurance companies. It was during the administration of Governor Cox that the difficulties were adjusted; it was necessary to incorporate a provision in the Ohio Constitution to offset any unconstitutionality of the legislation. This constitutional provision is Section 26 of Article 11 of the Constitution of Ohio as amended effective January 1, 1924.

The first acts were optional as to coverage, but in 1913 an act was passed making coverage compulsory by employers employing five or more workmen in regular line of employment. The schedule of compensation was fixed at a maximum of $12 per week; later it was increased to $15. Then a later provision required coverage by employers employing three or more workmen, and the maximum compensation was placed at $18.25 per week. The details of these changes are a part of the interesting political history of Ohio, but have nothing to do with the basic principles.

Conclusions

WE ARRIVE then at these conclusions: Workmen's compensation is invoked for the purpose of compensating injured employees or the dependents of killed employees, including disability or death from occupational disease.

The administration is delegated to a supposedly non-partisan department. We have in Ohio the Department of Industrial Relations, the Industrial Commission and the Workmen's Compensation Law, together with the administrative code and laws governing these separate branches. In addition the state Department of Health has its say on industrial or occupational diseases.

There is under the present system too much arbitrary power and too much overlapping of effort. These forces could well be coordinated to a better administration of the act and a resultant economy, for there are yet many defects in its administration.

I have suggested that inasmuch as the theory of workmen's compensation is sound, it should either be worked to completion or entirely abrogated. It has, however, become such an important part of economic and industrial life that I do not believe it will be abrogated. It must, therefore, be studied with a view to the application of its principles in the fullest sense and a lessening of administrative costs.

Right of Employer to Require Injured Workman to Submit to Surgical Treatment Under Workmen's Compensation Statutes

THE THEORY of workmen's compensation legislation is to furnish injured industrial workers more certain, prompt and fair compensation for impaired earning capacity than could be obtained under the old common law order. But it was never intended for a haven for malingerers or chronic objectors—to enable them to fasten the duty of maintenance upon their employers by virtue of some injury reasonably subject to correction by surgical treatment—by simply refusing to accept surgical treatment.

The question, then, of the right of an employer to require an injured workman to submit to surgical treatment as a means of effecting a cure, on pain of loss of compensation, is one of importance to industrial employers. The subject has been litigated in a number of cases, and the trend of the holdings may be thus summarized:

First: Where the surgical treatment contemplated is classed as major, i.e., where it may endanger the life of the workman, the latter may not be required to submit thereto.

Second: Where the treatment is minor and void of danger to life, it may be required as a condition to the continued receipt of compensation. The judicial reasoning on this subject may be illustrated by a brief review of an important case of each class.

As an example of cases in the first class, i.e., where submission to surgical treatment will not be enforced, *McNally* v. *Hudson*, etc., 87 N.J.L. 455, 95 Atl. 122, will serve.

Here a workman in the course of his employment suffered an injury that developed into a femoral hernia. The medical proof showed that the condition could be cured only by an operation; that while the operation was considered major, it involved but slight danger to life. The trial judge ruled it was the duty of the workman to submit. On appeal, the higher court, in reversing the judgment, said in part as follows:

"In the present case the proof before the court was that out of 23,000 operations only about 48 have been unsuccessful or resulted in death. The consensus of opinion of the medical witnesses is that the operation is a major one, accompanied with some peril to life. Although the peril to life seems to be very slight, 48 chances in 23,000, nevertheless the idea is appalling to one's conscience that a human being should be compelled to take a risk of death, however slight that may be, in order that the pecuniary obligation created by law in his favor against his employer may be minimized. . . . It is true that the question whether a workman reasonably refuses to have an operation performed is one of fact for the trial judge to determine. It cannot, however, be properly said that where it appears, as it does in the present case, that a risk of life is involved, the refusal of the prosecutor (workman) to submit to an operation is unreasonable. There was, therefore, no basis for the order made by the trial judge that the prosecutor should submit."

A decision in which the right of an employer to require an injured workman to submit to surgical treatment was that in *Kriconovich* v *American Car & Foundry Co.*, 192 Mich. 687, 159 N.W. 362.

Here claimant suffered a compound fracture of his right leg between the knee and ankle. He was operated upon twice and apparently made a complete recovery, but continued to complain of pain in his leg. The employer's surgeon suggested a slight operation that gave every promise of relieving the condition. The claimant refused on the ground that he was afraid the surgeons would cut off his leg. The board upheld the claimant, but the higher court, in reversal, said:

"The three physicians who testified . . . agreed that the operations performed on the claimant were successful and the wound had healed perfectly. Therefore there were no objective symptoms of pain, and the pain complained of by claimant, if there was any, in their opinions could be caused only by the entanglement of a nerve filament in the scar or in the callous thrown out by the bone in the healing process. They all recommended what they termed a slight operation, to chisel out some of the callous and loosen up the tissue. . . . There was nothing in claimant's physical condition or in the nature of the operation to make it dangerous to life or health. Before the defendant (employer) is to be charged, in law or morals, with the duty to compensate him, the claimant should first discharge the primary duty owing to himself and society to make use of every available and reasonable means to make himself whole. This, in our opinion, he has not done, and the defendant seems to have discharged the burden of proving that the claimant's refusal to submit to the operation . . . is unreasonable. . . . The order of the board . . . is reversed, and claimant should not be allowed compensation after . . . until he submits to the operation."

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"IF THE medico-economic quartet, consisting of the worker, the doctor, the hospital, and industrial management, through their respective organizations or duly appointed representatives, would only come together in the spirit of harmony and mutual helpfulness on some fair and common platform, there would be little need, in the ultimate solution of the various problems related to the economics of medical and hospital care, for that vociferous quartet made up of the so-called lay leader, the ubiquitous uplifter, the professional propagandist and the revolutionary reformer!" — LEVERETT D. BRISTOL, M.D., Dr.P.H.

EDITORIAL

Hydrogen Fluoride

THE physiological effects of hydrogen fluoride have not been determined fairly accurately on account of inadequate control of experimental procedures and the difficulties in the handling and measurement of volumes of the gas used in such procedures.

The relatively small amount of data regarding the action of this gas has resulted from descriptions of cases following accidental poisonings or exposures.

Machle, and others, working in the Kettering Laboratory of Applied Physiology of the University of Cincinnati, have devised a special exposure chamber, sampling and meter apparatus,* whereby experimental conditions could be properly controlled. With this apparatus, experimental and control animals were studied, using the exposures to atmosphere containing various amounts of hydrogen fluoride per liter of air.

Various types of exposure occur in different kinds of manufacturing, notably phosphate fertilizer works, the etching of glass, the preparation of antimony fluoride, in the aluminum industry, and more recently the use of chlorine-containing refrigerants. Although the latter type of compounds is relatively nontoxic, and non-inflammable, and fairly stable, yet it will decompose on passage through a flame.

The pathological findings are of considerable interest, and were briefly as follows: injury to corneæ and nasal mucous membrane; cardiac dilatation with congestion and myocardial injury; pulmonary hemorrhage, congestion, emphysema and edema, with bronchopneumonia in many instances; hepatic congestion with varied evidences of parenchymal injury; splenic congestion and edema; renal congestion and edema of other organs. The lung findings were the most constant.

The nature of the exposures creating such reactions were also significant. Exposure to atmospheres containing 1.0 to 1.5 mgs. of hydrogen fluoride per liter produced death in the significant proportion of animals exposed for five minutes or more. Concentrations at or above this level probably may be considered dangerous for exposure of any duration. It is interesting to observe that although no death occurred in two groups exposed to 0.79 and 0.50 mgs. per liter respectively for five minutes, the majority of these animals after being killed for necropsy from 25 hours to 55 days after exposure, revealed typical pathological lesions. Exposure for six hours in atmospheres containing 0.044 mg. per liter caused no deaths, although some evidence of liver and kidney damage was seen in three animals exposed to this concentration and examined within a 22 day period following. Of further interest is the fact that one rabbit examined 18 hours following 41 hours of daily six-hour exposures to 0.0245 mg. per liter had suffered considerable liver and kidney damage, with some evidence of an early fibrosing process in the emphysematous lungs. It was believed that this concentration, while too low to cause death,

* Machle, W., Thamann, F., Kitzmiller, K., and Cholak, J.: The Effects of the Inhalation of Hydrogen Fluoride. I. The Response following Exposure to High Concentrations. *J. Ind. Hyg.*, XVI.: 129. (March) 1934.

would be unsafe for prolonged exposure, although further study on this concentration and lower levels will be described in a later report.

Further research on this subject should be followed with a great deal of interest by industrial physicians, particularly those who are interested in solving the many problems in relation to exposure to various types of gases and vapors. The addition of further knowledge concerning threshold limits and procedures designed to measure concentrations in the working atmosphere will be of great necessity in the future prevention of occupational diseases.

Electrical Injuries

THE importance of electrical injuries in the various industries is now becoming apparent, although there has been a great deal of time and attention given to the study of this type of industrial injury.

Basing his study upon approximately 900 cases of electric shock, of which 627 have been selected as meeting certain requirements, Maclachlan* has analyzed the body of data available upon these injuries making comparisons by months, by hours of occurrence, by potential of circuit, by duration of contact, and comparison of elapsed time between the shock and the application of resuscitation.

The conclusions reached were as follows: It has been shown that in public utility work there is an increase in electrical accidents during the summer months, possibly caused either by the nature of the work then carried out, or by the heat causing perspiration, or both. The percentage of successful resuscitations is lowest during summer.

During the working day, the accidents increase early in the morning, drop off during the day, and again rise in the late afternoon. The percentage of successful resuscitation is low in the early morning, rises to the noon hour, then follows a drop, a rise early in the afternoon, and a drop to the late afternoon.

There is some unexplained connection between frequency of serious electrical accidents and the success of resuscitation. Accident frequency increases in summer; success of resuscitation decreases. Accident frequency decreases in the middle of the day and success of resuscitation increases.

Considered by the potential of the circuit, most of the accidents occur on primary (760-4999) lines and least on high tension (40,000—). The success of artificial respiration is least on primary circuit shocks and greatest on high tension circuit shocks.

Considered from the standpoint of duration of contact, laboratory results are confirmed by field information which indicates that the shock is more severe where the duration of contact is increased.

A most important confirmation of laboratory results is that, where the elapsed time between shock and application of artificial respiration is least, the success of artificial respiration is greatest.

Over a 15-year period, trained men in a group of public utilities, resuscitated from electrical shock 49% of the cases they attended. If only those cases in which they were not interfered with or in which there was some chance of success, are considered, the percentage resuscitated rises to 64.

In burn cases, electrical burns are more frequent than heat burns; they cause the greatest lost time per case, the least number of deaths, but the greatest number of permanent disability cases and amputations.

In fatal cases, the higher the potential, the greater the percentage of fatalities. Electrical shock is the major cause of the fatalities, but heat burns and injuries from falls also take their toll.

It is through the application of such principles of analysis that our collective information regarding the occurrence of electrical injuries will be increased in the future; however, it is necessary to apply this information directly to groups affected and exercise constant vigilance indicated by such information, before the results of control can be expected.

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Silicosis

OUTSTANDING in the business of book publishing is the new book entitled "The PNEUMONOKONIOSES (Silicosis) — Bibliography and Laws," compiled by George G. Davis, M.D., Ella M. Salmonsen, Medical Reference Librarian, The John Crerar Library, and Joseph L. Earlywine, Lawyer, all of Chicago. This is one book that will not grow old; its value for the complete subject, as to all the literature of the world, is permanent; and the yearly supplements beginning in January, 1935, will keep it permanently up to date, on this very vital and supremely important subject.

Amebiasis

—*Amebic Dysentery: Bibliography, 1920-1934** —

by

ELLA M. SALMONSEN
Medical Reference Librarian
The John Crerar Library,
Chicago

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Industrial Medicine Digest

Arthritis in Industry

DR. T. M. RIVERS, *in Journal of The Florida Medical Association,* (October, 1933):—Perhaps arthritis is second only to the common cold as a menace to industry. In the first place, industry may be an important factor in producing the disease, or, more often, in aggravating the disease after it has been started by other causes; and, in the second place, the disease may hamper industry by attacking trained laborers and forcing their temporary retirement while less capable men must be substituted to the detriment of organized business.

Many cases of traumatic arthritis have their origin from accidents in industry, and it seems to be a tendency of both types of arthritis deformans to attack joints which have received injuries in former times, especially, such injuries as have not fully been restored. For this reason, it behooves the surgeon in attendance upon injured persons to see that all joint injuries are fully restored as nearly as possible to normal before patients are discharged. Again, the arthritis may have existed long before the alleged injury; a matter worth determining at the first call to an alleged injury before such person has time to adjust a statement to the contrary. This should be done in justice to all concerned. A case of this kind may be the basis for a litigation which may depend entirely on the evidence of the attending physician, which places the greater responsibility upon the attending physician to do justice to all concerned.

Cold from exposure was given as one of the major causes of the atrophic type of arthritis deformans. Here, again, there may be a question as to the responsibility of the employer in the development of this disease. It behooves every corporation employing large numbers of laborers, to have an expert examining physician and surgeon to give each employee a thorough physical examination before placing laborers in their work. We have observed that only the spastic type of people are highly susceptible to colds and the allergens, two of the most important causes of this type of arthritis. By taking the blood pressure and completing a general physical examination and getting the family history, it is not hard to determine who are spastic, and none of this class should be placed where there is much exposure to unfavorable weather conditions, neither should they be placed where they have to breathe disagreeable fumes of smoke and other gases which excite allergic sensitivity. It is well to reject the ones who have extremely low blood pressure, since they are especially susceptible to atrophic arthritis and other allergic diseases, and their employment entails too great risk for disorganization of business by attacks of these diseases.

Since the hypertrophic type of arthritis usually appears after middle life and progresses slowly, it concerns industry less than the atrophic type; but those laborers who are retained into the first years of senility should be watched for hypertension and the hypertrophic type of arthritis, lest this disease creep on to interfere with the operation of a mill or a machine. However, this type is due less often to cold from exposure, and there is no need of uneasiness from this source. It is more liable to come in conjunction with arteriosclerosis, a condition of serious importance to laborers who are doing strenuous work.

When persons employed in industry begin to develop either type of arthritis deformans, they should be required to undergo treatment early—before the disease develops some of its terminal symptoms and permanent deformity results, with the corporation held responsible for the exposure or other cases resulting in the crippled condition.

The atrophic type of arthritis deformans is due to the astringency of certain agents acting upon the capsular ligaments to make pressure on the blood vessels penetrating these ligaments, causing a passive congestion of the subcapsular tissues. With this thought in mind, it is clear that this astringent action must be overcome by some drug or other agent to relax this ligament and permit the blood to flow along in its proper course. If this is done early and the cause is removed to prevent further action from the source, the disease is easily relieved; but, if treatment is delayed until the red cell infiltration is replaced by fibrous tissue proliferation, and the pannus has adhered to the ends of the bones, the condition is much graver, and this increases during each day of delay. Let it be remembered that every case of atrophic arthritis is a very serious condition if treatment is not immediate and persistent. The first thought is to relax the tissues of the capsular ligament to permit the blood to move along normally; but this must not end the treatment, for the cause must be removed to prevent persistence and recurrence of the disease. Sometimes we get wonderful results from our salicylates or other relaxing agents at first; but, after a few days, the disease recurs with greater severity. This is usually due to the fact that the cause is not removed, and the disease grows worse as the body becomes immune to the relaxing agent. Then a change of treatment may relieve again. Thus we go from one remedy to another with its remissions at first from each remedy, followed by exacerbations as the body becomes immune to the remedy, while the joint becomes more nearly fixed each day. The cause must be found and removed, to give certain and permanent relief. Again, it must be borne in mind that the cause began as a focal infection; but it may have progressed to a general systemic infection, in which case, not only the focal infection should be removed, but also the systemic infection should be overcome by the use of a vaccine. Heat in one of its forms is a wonderful relaxing agent and may be applied to the affected joint with good results; but it must be remembered that heat increases the activity of bacteria, and in cases of local infection the inflammatory process may be better controlled by retarding the action of the bacteria with ice applications.

In the treatment of the atrophic type of arthritis, it is well to remember that this type is more common to the spastic type of people and that the acute attack should be followed up with tonics of codliver oil, yeast, and ample foods rich in proteins, as milk, eggs and red meats.

In both types of arthritis deformans, the carbohydrates should be limited in the diet, since the obstruction to the circulation prevents the oxygen

from coming into contact with the sugars to burn them in the body.

The author concludes that arthritis, being a very neglected subject, should receive more attention and investigation than it has received in the past. Laborers should be so placed that those who are more susceptible to the disease may receive the leas texposure; much should be accomplished by early treatment while the disease is amenable to treatment.

Medicine As An Industry In a City

DR CHARLES S. VENABLE, *in Texas State Journal of Medicine,* (November, 1933): — The author shows by statistics that medicine is one of the leading industries in San Antonio and that through the sole influence of medicine, several millions of dollars are distributed in that city annually. He believes that the facts brought out in the survey are practically true of all communities, and further that there is no selfish motive involved, since the physicians receive only about 7% and the hospitals only 6% of the total amount that is brought by medicine from outside sources into the community, while the remainder of some 87% goes directly into mercantile channels.

An estimate of the total number of out-of-town patients treated during 1932 in San Antonio, was reached by arbitrarily multiplying by 3.5 the more accurate figures received from 100 answers to a questionnaire sent to 635 physicians and dentists. The per diem cost of $7 per patient is also arbitrary, but was arrived at after asking many patients in different walks of life the cost to them, and after receiving estimates from the different departments of the Chamber of Commerce and the Hotel Men's Association, all of which ranged from $11 to $16 a day.

The total number of out-of-town patients treated in the offices of San Antonio physicians in 1932, was 71,-186. These patients spent an average of seven days in town, or 498,305 town-days, at an estimated cost of $7 a day per person, making the total amount spent by them, $3,488,138.

An average of 2.3 persons accompanied each of these patients, or 189,-924 persons, who spent on the average five days in San Antonio, or a total of 949,620 town-days at $7 a day. These persons, then, spent $6,647,340 in San Antonio in 1932, which amount, added to the per diem expense of $3,488,138 of the non-hospitalized patients, totals $10,135,478 in which grand total neither doctors nor hospitals participated, but which was spent entirely with merchants, restaurants, druggists, mortuaries, garages, places of amusement, etc.

In addition there were 11,389 persons sent to the hospitals of the city, who averaged eight patient-days, at an average cost of $7 per hospital day, making a total of $637,784 spent in the hospitals, as well as a total amount of $787,304 paid physicians for pofessional services. The grand total of money brought into and spent in San Antonio by patients and those accompanying them was $11,562,566; of this amount the physicians received only 7% and the hospitals 6%.

It may readily be seen that the balance, exclusive of that received by physicians and hospitals, was $10,135,-478, or 87% of the total, in which the commercial interests of the city were the sole beneficiaries. This study revealed that the practice of medicine as an industry is greater than that of all the conventions in 1932 combined, and, as a permanent source of income for a city, medicine is an important asset of community endeavor.

Heart Problems in Industry

DR. WILBER E. POST, *in International Journal of Medicine and Surgery,* (October, 1933):—Occasionally occupation is a factor in the etiology of cardiac disorder, but, for the most part, the etiology of cardiac disorders common in industry have little to do with the industry. This is especially true with the railroad industry. What the railroad is most peculiarly concerned with is the detection, in diagnosis, of those heart disorders which might lead to sudden heart failure and thus mean peril to lives or the destruction of property.

The early diagnosis of heart trouble is important. This may depend in part upon having periodic examinations, or upon having compulsory examinations after all illnesses, before the employee returns to work, or upon educating the employer in the nature of danger signals of heart disease, and to consult the physician promptly when those signals appear. But it is quite as important that the physician be alert to stop and look and listen to the patient for those signals when he is consulted. It has been interesting to make even a partial list of the early manifestations of heart disorders. Many are first noticed by the physician in the course of a routine examination—an arrhythmia, a tachycardia, a dilation, a murmur, an abnormal pulsation of the precordium, or some sign of beginning decompensation—when the patient has not suspected heart trouble. There are numerous experiences which the patient may have had which call for examination, such as labored breathing, dizziness or faintness, extreme tachycardia, a smothering sensation, digestive disturbances, general weakness and lack of endurance, cramps in the calf muscles at night or severe headaches at night in elderly persons. These are only a few of the symptoms which may indicate difficulty with improper heart function. The point to be kept in mind is that while some of these symptoms may not signify heart disease, when they do appear, we should give them due consideration.

The electrocardiogram is seldom the means of discovering a heart lesion. Occasionally it reveals a coronary disease. More often it locates for us the site of the lesion in auricular or ventricular muscle or in the stimulus conducting mechanism.

When a cardiac disorder has been demonstrated it is most important to determine as carefully as possible the nature and cause of the disorder. The author limits his discussion to a few general problems, such as heart murmurs, arrhythmia, myocardial damage with dilatation and decompensation, and cardiac pain.

Laboratory Methods in Industrial Hygiene

DR. LLOYD ARNOLD, *in Illinois Medical Journal,* (November, 1933):—The primary factor to consider in industrial hygiene is atmospheric pollution with gases or solids in suspension that are toxic to man. In addition to this, cutaneous or skin contamination by direct contact with material used in industry, also must be taken into consideration in industrial hygiene. But, primarily, we are concerned with the prevention of atmospheric pollution. The rapid progress made in industry has been due to the rapid and persistent utilization of the research work performed in laboratories. The research work done in the field of medicine and its

allied subjects usually requires time and a certain lag period before it is incorporated in the practice of medicine or any of its specialties. Industries promptly take over and incorporate new methods and new processes. This leads to a constant changing atmospheric environment around the worker. New products are constantly being formed by the machines, and atmospheric pollution becomes an important problem in the preservation of the health of the worker.

The laboratory methods used to aid in the prevention of industrial intoxications are more chemical and physical in nature than those used in the control of communicable diseases which are primarily bacteriological in nature. The methods of determining atmospheric pollution concern themselves with the analyses of both the physical and the chemical status of foreign materials suspended in given air samples.

Industrialization has taken place so rapidly that it is impossible to expect the worker to adapt himself gradually to the atmospheric pollutions produced during certain processing methods. The combination of ventilation and efficient respirators or filters must be relied upon to protect him. The efficiency of both of these principles can be tested by laboratory methods. Silicosis has recently come to the fore in Illinois as an industrial hazard under certain conditions. In addition to the determination of suspended particles, mentioned above, the x-ray can be used to determine the degree of pneumoconiosis. Asbestosis is another example of an industrial hazard that is now occupying the attention of students of industrial hygiene. The examination of the sputum has been recently shown to be of value in the diagnosis of this condition.

The worker can be examined to see if he manifests any maladjustment to his industrial environment. The various blood examinations of gaseous substances toxic to the hemopoietic system have been placed on a sound and reliable technical basis. But these methods tell us the relative degree of damage done to the worker. We are determining maladjustment due to contact with some toxic substance. The best approach to this problem is through preventing contact of the worker with a given irritant. The limits of concentration of many of the known toxic substances in the air are known. We have well established methods and apparatus for the quantitative determination of these substances. Examples could be cited, such as benzene and its derivatives, carbon disulphide, carbon monoxide, etc. The exact degree of atmospheric pollution can be easily determined; the same holds for the heavy metals, lead, mercury, arsenic, etc. The silica and related hazards can be handled in the same manner.

We have sufficient knowledge of exact methods that can be used in industrial hygiene to protect the worker, to be useful if they are properly applied. The problem now before us is to apply these various methods and determine their clinical value. Further investigation is necessary in some of the fields but the greatest need is conscientiously to apply known and prescribed methods in industry in order to create a hygienic environment.

Silicosis in Rochester

DR. WILLIAM S. McCANN, *Professor of Medicine, University of Rochester, in Bulletin, The Self Insurers Association,* (January 2, 1934):—Not long ago a deluge of common law suits for negligence fell upon various industrial employers in Rochester. It came with the suddenness of a tropical hurricane, taking most of them by surprise. In the beginning it was alleged that the injury was due to "silicosis." Most employers who had heard of this disease at all thought of it chiefly as a disease of miners and quarry men, with little thought of the possibility that it might arise in a great variety of manufacturing plants, and least of all in a transportation company.

It soon became apparent that someone had been industriously searching the lists of employees and ex-employees of a number of companies for those who had died of tuberculosis or other pulmonary diseases, or for those who were in tuberculosis sanatoria, and later for those who might be expected to have silicosis. A large number of these men were given preliminary examinations by one physician on the basis of whose findings suits were filed by the dozen, nearly all being represented by one attorney.

In October, 1932, one of these cases went to a jury, which gave a verdict for the plaintiff awarding nearly $14,000 to the widow. In this case it was clearly shown in the evidence that the deceased had died from the rupture of an aortic aneurysm into the oesophagus, that this aneurysm was due to syphilis. It was conceded by the defense that the deceased had tuberculosis. The plaintiff's counsel brought in very weak evidence that silicosis was present; for instance one of his witnesses reported that the ash of the lung of the deceased contained 2.2% of silica, an amount which is not more than one-seventh of the amount which may be found in the ash of normal lungs.

Following this triumphant demonstration of what a jury might do, Rochester resembled nothing so much as a barnyard just after the swoop of a chicken hawk. A large number of cases were reported to be settled out of court for sums ranging from $2,000 to $4,000. These received due notice from the press with the result that many workmen, mostly unemployed, hastened to be examined in the hope that they too might participate in the rapidly growing racket.

At this point we will leave our account of offensive operations for the plaintiffs to trace the progress of organization of the defense.

A group of industries in and near Rochester decided to subsidize some research at the University. This was to be carried out in the department of medicine at the Medical School. We knew relatively little about silicosis at the start, but we had facilities for finding out what the world knew about it. A rapid survey of the literature showed that there was one phase of the problem which we were in a position to attack immediately, which no one else had investigated. We chose to start with this phase, meanwhile attempting to inform ourselves as widely as possible of the work of other investigators. I will speak of our own investigations a little later.

While these were getting under way, we held council with safety engineers and plant managers, through the Industrial Management Council of the Rochester Chamber of Commerce. We decided that without the equivalent of "military intelligence" we would be fighting the battle blindly. It was necessary to send up observation balloons to see behind the enemy's lines, and to take a few prisoners to identify organizations on the opposing side, and to take all measures possible to estimate the enemy's maximum strength and resources.

The measures which we took to accomplish this were as follows:

1. We enlisted the aid of the Met-

ropolitan Insurance Company, which sent Dr. McConnell with some assistants to make dust counts and to survey dust hazards in several plants. Through the courtesy of these gentlemen a young chemical engineer was trained to do this work permanently for the I. M. C.

2. Facilities were provided for making a rapid x-ray survey of active employees in a number of plants. A portable outfit was purchased which could be taken into a plant. Workmen were examined with little loss of time. This gave us quickly a rough estimate of the "cannon fodder" which the opposing general could count on in the future. I will refer to some of the results of this survey later.

3. In the meanwhile the research program at the University was progressing. We were learning things about silicosis. We were finding out how silicosis brought about disability in workmen who acquired it. We were correlating the x-ray appearances with the degree of disability. We were finding men who had received settlements who were not disabled in any way.

Soon attorneys for the defense were sending us men to examine, either on court orders or by agreement. This was most instructive. It took us into the field of differential diagnosis. We soon learned that quite a number of different diseases can produce changes in the lungs which resemble closely the early stages of silicosis as far as x-ray pictures are concerned.

An interesting result of this phase of the work was a change in tactics on the part of the enemy. He began to allege injury on a broader basis, silicosis became pneumoconiosis, and this in turn became "fibrosis and diseases of both lungs and upper respiratory passages due to the inhalation of dust." The attack was carried into the camp of the gypsum industry, into the wool carders, and even into that of silk weavers. Rumor has it that attacks will soon be launched against industries having other organic dusts. This is the equivalent of drawing the defense out of its trenches into "no man's land" with the prospect of rapidly shifting warfare in wide open country. In dealing with silicosis the defense could entrench behind clear cut definitions of a specific disease with a specific cause and a highly characteristic pathology. Pneumoconiosis is less specific. Medical opinion tends to limit it to inorganic dusts at least, with differences in the pathological changes produced by different dusts. Fibrosis is still more general and less easily circumscribed. It covers the territory of infections and injury by fumes and gases, by circulatory disturbances as well as injury by dust. All three of these processes are limited at least by the extent of the lungs themselves. The outermost works of the defense end here, still vulnerable to attack from above through "the upper respiratory passages."

In this rapid sketch I have tried to outline the battle. For the moment there is a lull in the fighting, just a little desultory firing and occasional Verey lights and other fireworks illuminate the scene. Out in front of each company sector is the barbed wire of the law's delay, behind which the trenching tools are busy. Masks and helmets are being provided. Channels of communication are being organized. Back at G.H.G. men are busily at work already on plans for a retreat behind the Workmen's Compensation law, if the defense should fail to hold the line of the common law.

Let us now scan the reports of our military intelligence service. Preliminary dust counts showed that in a number of plants dangerous quantities of dust were in the air, in spite of the fact that operations were proceeding at a mere fraction of normal.

The results of the x-ray survey so far have likewise been disturbing. It would not be proper for me to quote actual figures or to refer to any particular company or industry. On the basis of more than 1,000 examinations of x-rays of the chest the most significant finding was that only about 30% of the lungs examined could be considered normal. In interpreting the films, whenever normal lungs were found, the typist was questioned as to the occupation of the employee. Almost invariably the possessor of the normal lungs was a machinist, a watchman, an office worker or a very new and young employee.

Now it must not be inferred that 70% of the employees in the industries surveyed have silicosis or pneumoconiosis. Far from it. About 40% of the total exhibited pathological changes in the lungs which did not in the least resemble those of silicosis or pneumoconiosis. This group comprised all sorts of abnormalties. We could see evidences of chronic nontuberculous infections of the lower lobes, bronchiectases, pleural adhesions and the fibrosis of heart disease accompanied by abnormal shadows of the heart and great vessels. We found a certain amount of adult tuberculosis, some healed, some apparently latent and some undoubtedly active. In fact this large group of 40% gave all the common types of pulmonary disease that one could find in any group in the population of similar ages.

With 30% normal, 40% showing abnormalities not directly attributable to dust, what about the remaining 30%? This latter group is a difficult one to analyze. In it were included all individuals whose lungs showed a diffuse reticular fibrosis, with increased density of the shadows at the root of the lungs. All such cases were considered as suspected pneumoconiosis. If the reticular markings showed a tendency to agglutinate or to give a suggestive nodular mottling, we changed "suspected" to "probable early pneumoconiosis." If the nodular mottling was clear cut a definite diagnosis of pneumoconiosis was made.

We did this in spite of a firm belief that the diagnosis of pneumoconiosis should never be made on the basis of history and x-ray examination alone. What we were implying was that the employee whose chest film we had seen was definitely one who could sue for damages with great probability of success in a trial by jury.

Naturally, the findings in individual cases were guarded with great care in order to avoid provoking litigation. The employer was put in possession of information which would enable him to deal with the situation in such a way as to forestall litigation. Furthermore, the discovery of cases of active tuberculosis, whether accompanying silicosis or not, enables the employer to remove these dangerous individuals from contact with other workers whom we know to be abnormally susceptible to this disease.

The full significance of surveys such as this will not be apparent until we are able to compare the findings with a similar survey among men of similar age groups selected from a population which is not exposed to an unusually dusty atmosphere. Unfortunately we are unable to make this comparison at the present moment.

I ask you, though, what attitude you would take toward these findings if you were going to insure the employers of these men against liability. I feel sure that the most experienced veteran among you would be unable

to estimate a safe premium for assuming this liability at the present time. There are still too many unknown quantities. It is not enough to calculate on the men known to have signs of pneumoconiosis. What about the 40% with all sorts of other pulmonary diseases? Are these men rendered more susceptible to dust injury thereby? Is there a possibility that dust may be a contributory cause in producing respiratory diseases other than simple pneumoconiosis? This last possibility is worthy of your gravest attention. I have mentioned the fact that in the more recent cases in Rochester the injuries alleged are described in more and more general terms, such as "fibrosis and diseases of both lungs and upper respiratory passages." We must carefully consider what support medical science is likely to give to the claim that dust may be a direct or contributory cause of a wide variety of injuries.

In this connection I invite your attention to some studies emanating from the U. S. Public Health Service, particularly to a summary in P. H. Bulletin No. 208. It has been clearly shown that workers in coal mines both bituminous and anthracite have an excessive mortality from pneumonia and influenza as compared with similar groups of males in the same counties who were not miners. Among cement workers influenza and grippe were found to have a higher incidence than among a large group of industrial employees of miscellaneous industries, see P. H. Bulletin No. 176, which quotes in some detail the opinions of Collis, who believes that dust contributes to a higher incidence of bronchitis.

I do not wish to be put on record as a champion of these views. Many unknown factors must be evaluated before a final opinion is reached in this matter. I call it to your attention rather bceause it might be possible to impress a jury with Dr. Collis' views. If the racketeers are successful in winning suits in cases of infectious injuries to lungs and upper air passages the result will be complete chaos in the field of insurance. Even though they can be restricted to recovery for pneumoconiosis the tribute levied from industry will be colossal. Any way one looks at it, whether this tribute is to be paid through common law action or whether it is paid through compensation, it will be a burden too heavy for some industries to stagger under.

I feel sure that the cost of eliminating dust will be far less than the cost of insuring against the hazards of dust. Money should be invested now in research in dust prevention and dust removal. I cannot believe that inventive genius will fail to respond to this dire necessity. Different industries will have to solve this problem in different ways, but no one can doubt that ways can and will be found and that they will be less expensive than paying for lawsuits or awards.

The writer is of the opinion that it would be wiser not to hasten the movement toward inclusion of pneumoconiosis in the Workmen's Compensation law. Ultimately this will be desirable. It would be better to await the outcome of the common law actions which are pending. Medical opinion and legal precedents may be established which will be favorable to the employer in regard to the contributory effects of dust upon non-tuberculous respiratory infections. If a retreat to Workmen's Compensation is forced an effort should be made to adhere as closely as possible to injuries or diseases which can be specifically defined. While this may leave some opportunities open for common law actions, it will be better than any attempt at a blanket coverage the cost of which would be ruinous to industry.

Finally, specific provision should be included that compensation should be adjusted to the degree of disability. This will eliminate most spurious claims.

The tests which are being devised at the University of Rochester will give an objective and reliable measure of the functional capacity of the respiratory organs. These tests include determination of the vital capacity and the residual air, the sum of which is the total pulmonary capacity. The ratio of residual air to total capacity, the degree of saturation of the arterial blood with oxygen, and the manner and extent to which the ventilation of the lungs can be increased during exercise, these are the factors which enter into the assessment of respiratory function. A large number of normal individuals have been studied in order to establish standards of normality for comparison.

Health Engineering

JOEL I. CONNOLL, *in Illinois Medical Journal*, (November, 1933):—The engineer has now been called upon to enter industry and apply there the scientific principles which have proved successful in other fields. Industrial hazards to health are largely environmental in character. They involve toxic dust, gas, and fumes in the air that is breathed, toxic solids and liquids that are handled and may be absorbed through the skin, bacteria, noise, vibration, electricity, light and short wave-length energy.

A few examples will illustrate. Lead or silica dust, carbon monoxide gas and chromic acid fumes are hazards in the air that workmen may breathe. Phosphorus, a solid, and benzol, a liquid, are familiar examples of these classes of hazardous materials, while anthrax is representative of the bacteria, especially associated with industrial dangers. The noise and vibration of punch presses have certain harmful effects, while bright lights, as produced in welding, may damage the eyes unless shielded.

Gases fall into four groups, each with a characteristic physiological reaction.

1. Asphyxiants may be of two kinds. One kind combines with the hemoglobin of the blood, or with tissues, in such a manner as to prevent the utilization of the oxygen in the air breathed. There are a large number that may be encountered, among which carbon monoxide and hydrocyanic acid are perhaps the best known. This kind we call chemical asphyxiants. The other kind (simple asphyxiants) in high concentration excludes oxygen in a mechanical manner, without any marked physiological effect of its own. Nitrogen, helium, and hydrogen are examples of simple asphyxiants.

2. The second group may be called irritants, producing inflammation of the respiratory tract. Ammonia, sulphur dioxide and chlorine are familiar irritant gases.

3. The third group includes volatile drugs, which do not directly attack the lungs but which exert their anesthetic effects after they are absorbed into the blood. Methyl chloride, ethylene dichloride, nitrobenzene and carbon tetrachloride, are members of this group that are widely used in industry.

4. The fourth group comprises inorganic and organometallic materials which exert a poisonous effect after absorption. Mercury, hydrogen sulphide and tetraethyl lead, are typical of industrial poisons of this group.

The type of exhaust system to be

employed depends largely upon the specific gravity of the poisonous material to be removed. Thus, a gas heavier than air, such as carbon tetrachloride, which naturally drops to the floor, should be removed by a downward exhaust, making use of its natural direction of movement to assist the mechanical devices.

Often it is not economically possible to build a collecting system that will entirely remove the hazard to health. Here it becomes necessary to supplement the exhaust system with protective marks, of which there are many kinds and varieties. A sandblaster working on castings in a booth may be fairly well protected by a local exhaust system, but the man cleaning the face of a building with a sandblast frequently must rely upon a mask for proper protection, both to his eyes and lungs. A spray booth may give adequate protection to a workman spraying automobile parts or furniture with enamels or lacquers having a toxic solvent, but the workman spraying the Hall of Science at the Worlds Fair cannot put it in a booth.

The suppression of noise through better design of machinery has been another contribution of health engineers to the well-being of workmen in various industries. Where vibrations are unavoidable, as in stamping and punching, much has been accomplished, and much more remains to be done in the provision of foundations which will absorb vibrations and prevent their transmission to structural members of the building, which may act as sounding boards.

Adequate lighting is of great importance in preventing fatigue and in avoiding accidents. Short wave length energy, whether it be in the form of cathode rays, such as x-rays, or in the form of radioactive emanations, such as one gets from radium and mesothorium, are even more dangerous than the well known ultra-violet rays, which are commonly encountered in oxyacetylene welding. An example of the harm done by these forms of energy is the well known case of luminous watch dial painters in New Jersey, some of whom were fatally poisoned as a result of moistening brushes with their lips while employing a mesothorium luminous paint.

Frequent periodic examinations are essential to any well-balanced control program. These examinations must be made by a competent physician. The period between them depends upon the nature of the hazard, but in many cases they should be more frequent than is the custom today. For the more hazardous jobs there should be at least one a month. In certain cases monthly examinations for the detection of occupational disease are required by the state law. Considerable progress has been made recently in securing the cooperation of employers in a better observance of this statute.

In conclusion, much has been done in the application of engineering principles to the protection of health in industry, but we have only scratched the surface as yet. If we could put into practice all that is known already about toxic materials and how to control them, there would be much less ill health and lost time among employees. This is no excuse for stopping research, however, because the time will never come when practice will catch up completely with theory, and we should not mark time while waiting for this Utopia to be reached.

The Doctor in Politics

GEORGE W. ASPINWALL, *in American Mercury,* (May, 1934):—" * * * It may seem that family doctors have been sitting supinely in their offices while important groups of their patients were being taken away. It is true that as a general rule they have not been so active as they might have been in protecting themselves. But private physicians, working both as individuals and through their various organizations, have made efforts to avoid being deprived of their income. So far, their efforts have resulted in failure or only partial success.

Many hospitals encourage patients to use free clinics. The dimes, quarters and half-dollars paid to the free clinics by patients do not go to the doctors who give treatment but toward the hospital's expenses. When the income from a free clinic exceeds its budgetary requirements, the profit is devoted to some other hospital activity. The doctor giving his services free in the clinics seems helpless to prevent the hospital making a profit on his labor.

"An attempt to correct this situation was made at the last assembly of the New York State legislature. A measure known as the Crawford bill was introduced imposing a fine on a hospital supported by public or private contributions for accepting money from patients treated in a free clinic. If this bill had become a law every patient in a free clinic would have become an expense rather than a source of revenue to a hospital. Hospitals would have stopped encouraging free clinics patronage and some clinics would have been closed. But the bill was defeated.

"A second bill was introduced providing that a person able to walk and seeking free medical care must apply at a central registration bureau where his claim for charity would be investigated before he was sent to a free clinic for treatment. This measure also was defeated.

"Hospitals maintained a lobby against the Crawford bill. Family doctors, alone and in small groups, tried to convince the legislators that the bill should be passed. The doctors were told bluntly that few physicians take part in primary contests, that only about a third of the physicians in the state register for voting, and that therefore they had no claim on the legislators and no power to procure enactment of the law. The bills were defeated but the family doctors who would have benefited by their enactment had their eyes opened. The result of their mission to Albany is that the doctors are forming political organizations with the intention of making a fight. The family doctor never has been politically important. He has been too busy with his practice to find time for meddling in politics. But it seems that now, when he cannot earn enough money to support his family, he may meddle politically.

"The family doctors of not only New York state but throughout the country are sufficiently numerous with their families and friends to wield a powerful political influence if they should band together under proper leadership to battle with the ballot for self-preservation.

"It is conceivable that the family doctors of New York state could push a bill similar to the Crawford one through their state legislature. And it is not improbable that the family doctors of the nation could induce Congress to see that Uncle Sam takes the M.D. off his door. There are quite a few members of Congress who believe that world war veterans should be treated in hospitals in their own state by their home-town physicians, and that these physicians should be paid by the Federal government."

THE BULLETIN

of

The American Association of Industrial Physicians and Surgeons

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Armour & Co., Union Stock Yards, Chicago

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THE OBJECT of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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ANNUAL MEETING

THE 1934 Annual Meeting of the American Association of Industrial Physicians and Surgeons will be held in Cleveland, Ohio, Monday and Tuesday, June 11th and 12th. Headquarters will be in the Hotel Statler and the program and arrangements will be in charge of a committee of which Dr. A. G. Cranch, of the National Carbon Company, is the present chairman.

This will be the first meeting of the Association since 1931, and under the able direction of Dr. Cranch it should be a notable one. Since it coincides in point of time with the Annual Meeting of the American Medical Association, reduced fares will be granted by all railways. All members should plan to be present and should make hotel reservations early.

This meeting will be a very important one, as it will be necessary to elect new officers and an entirely new Board of Directors.

Like many of our other activities, our attendance upon medical meetings has been somewhat curtailed during the past three years; this will be a splendid opportunity to renew contacts, discuss problems and generate a new enthusiasm in our special line of work. As our meetings precede the scientific sessions of the A.M.A., to those who can remain a few days longer, its meetings will offer an excellent post-graduate course and acquaint you with many new things that have transpired in medicine during the past three years.

Program
Nineteenth Annual Meeting
Cleveland, Ohio
June 11 and 12, 1934

MONDAY: June 11, 9 a. m., Hotel Statler:

1. Business Meeting.
2. (Traumatic Neuroses).
3. (The Physician as a Witness).

MONDAY: June 11, 2 p. m., Cleveland City Hospital:

SYMPOSIUM ON SILICOSIS:

1. SILICOSIS: "Occurrence, Etiology, X-ray and Clinical Findings and Prognosis" (Illustrated by films, slides, etc.) Emery R. Hayhurst, M.D., Chief, Division of Hygiene; Consultant, Occupational Diseases, Ohio Department of Health.
2. SILICOSIS: "Relation to the Tuberculosis Problem"; R. C. McKay, M.D., Chief, Division of Tuberculosis, Cleveland City Hospital.
3. SILICOSIS: "Medicolegal Phases"; C. O. Sappington, M.D., Dr. P.H., Consulting Industrial Hygienist, Chicago, Ill.

MONDAY: June 11, 7 p.m., Hotel Statler:

Banquet, Nineteenth Anniversary;
President's Address;
Address: (Speaker to be announced)

TUESDAY: June 12, 9 a.m. Clinical Meeting, City Hospital:

1. Clinical Presentation of Acute Traumatic Cases; Members of Staff, Division of Surgery, City Hospital.
2. Plastic Repairs of Extensive and Mutilating Injuries; Donald M. Glover, M.D., Cleveland, Ohio.
3. Fractures of the Long Bones: George I. Bauman, M.D., Chief, Division of Orthopedic Surgery, City Hospital.

TUESDAY: June 12, 2 p.m., Cleveland, Clinic:

1. Repair of Tendon Injuries; James A. Dickson, M.D., and Wallace S. Duncan, M.D., Orthopedic Dept., Cleveland Clinic.
2. Conservative Treatment of Compound Fractures; Walter G. Stern, M.D., Cleveland, Ohio.

Central States Society of Industrial Medicine and Surgery

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ANNUAL MEETING

THE Annual Meeting of the Board of Governors of the Central States Society was held at the Sangamo Club, Springfield, Ill., May 14, 1934, preceded by a dinner. President Dr. John Grant, of Freeport, presided and the following were present: Dr. Sidney Easton, Peoria; Dr. Wm. J. Carter, Mattoon; Dr. J. B. Moore, Benton; Dr. James Finch, Champaign; Dr. Frederick Slobe, Chicago; Dr. Don Deal, Springfield; Dr. W. C. Nordholz, Chicago.

Reports of the last Annual Meeting, and of the Scientific Meeting which was followed by a dinner at Jacques French Restaurant held in Chicago with the Institute of Traumatic Surgery, and a financial statement, were read and approved.

The Secretary-Treasurer reported the death of Dr. Sidney MacLeod, of Chicago. A committee was appointed to draw up suitable resolutions to be sent to Mrs. MacLeod; and the motion prevailed that, in memory of Dr. MacLeod, Dr. S. J. MacLeod, Jr., be elected to membership and his first year's dues remitted.

The pending applications for membership were all approved with the exception of one, which was deferred with instructions to the Secretary-Treasurer to the effect that if he found the requirements of the Society to be properly met he then cast a ballot electing the applicant.

A motion prevailed that the Central States Society has not and does not endorse any industrial-surgeon directory where there is a charge made to the members of the Society.

Dr. Frederick Slobe of Chicago was duly appointed Editor for the Central States Society of Industrial Medicine and Surgery Section, and, as such, an Associate Editor of *Industrial Medicine.*

The Secretary-Treasurer then reported that the Chicago Society of Industrial Medicine and Surgery at its last annual meeting had voted to discontinue affiliation with the Central States Society as an organization but had recommended to its members to apply for membership in the Central States Society. The motion prevailed wherein a Membership Committee was appointed, empowered to recommend for membership to the Central States Society such members of the Chicago Society as possessed the qualifications the Central States Society requires for membership, and to act upon their applications.

At the business meeting, on May 15, 1934, in general session, Dr. Wm. C. Nordholz presented his Annual Report and the report of the meeting of the Board of Governors of the previous evening. These were unanimously adopted and approved. The report of the Nominating Committee was also unanimously adopted and the nominees elected as follows:

Officers:

President, Dr. P. A. Bendixen, Davenport, Iowa;

Vice-President, Dr. Geo. Apfelbach, Chicago, Ill.;

Secretary-Treasurer, Dr. W. C. Nordholz, Chicago, Ill.;

1937 Board of Governors:

Dr. John Grant, Ex-officio; Dr. Don Deal, of Springfield, and Dr. J. B. Moore, of Benton.

The Business Meeting was followed by a Scientific Meeting, which started at 9:30 A.M., with the following program:

9:30 A.M. "Experience in the Treatment of Essential Hypertension with X-ray," by James Hutton, M.D.

10:30 A.M. Symposium on Silicosis: W. D. McNally, M.D., Carroll E. Cook, M.D., Josiah J. Moore, M.D., Lloyd Arnold, M.D.

12:30 A.M. Traumatic Cases of Special Interest: By Members (10 minutes per subject).

2:45 P.M. Public Health Section.

The Scientific Meeting program will be published in *Industrial Medicine* in the near future.

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and
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Avoidable Wastage in Connection With Industrial Injuries

H. E. MOORE, M.B., CH.B., Surgeon, L. M. and S. Railway Company, in the *Liverpool Medico-Chirurgical Journal*, Vol. XLI—Part 1, 1933:—Some of us, who have to deal with the casualty lists of large corporations from the point of view of examination, and, in my own case, to a certain extent, treatment, have been so impressed, and I believe I might say without exaggeration, appalled, at the amount of wastage, and the inadequate methods of dealing with much of it, that we feel the whole question of the treatment of traumatic cases calls for a thorough investigation and discussion, with a view to analysing the causes of failure and discovering the means, if any, by which this wastage may be reduced.

A distinction must be drawn at once between avoidable and non-avoidable wastage. We are all aware that, however expert and efficient the treatment may be, some wastage is inevitable, but, at the same time we are equally conscious of a large volume of material which, as the result of either bad, or ineffective, or total lack of treatment, comes under the category of 'avoidable wastage.'

The mass of cases which come before us, divides itself, broadly speaking, into three main groups:

The first group consists of men who are permanently incapacitated—wholly or partially—with no hope of returning to their former jobs, and no treatment will avail to make them anything more than 'light duty' men in the future.

In the second group—that containing men with injuries from which either full or sufficient recovery to enable them to resume their former employment may be reasonably expected — some were still undergoing treatment of sorts, a good deal of it ineffective: I do not think anyone will suggest that the issue of a prescription for a liniment, and a medical certificate of incapacity on the occasion of the one weekly visit, is treatment, or the attendance at a hospital twice a week for massage is effective treatment. This particular group has, generally speaking, had periods of incapacity which appear to be out of all proportion to the normal expectation having regard to the injury itself, and to be more or less stationary.

Lastly, there is the large group of those who appear to have exhausted the patience both of hospitals and their own doctors, and to be just drifting. Any attempt at active treatment has ceased—in some cases for months—the incapacity periods are in some cases enormous; none of them appear to be capable of returning to work, either on account of their physical or mental condition, or both, unless some active assistance is forthcoming, and quite a number of them have been told that they will never be any better, and that nothing more can be done for them.

It is chiefly from material furnished by these last two groups, and particularly the last group, that I have obtained the evidence on which the conclusions I have come to—rightly or wrongly—as to the causes underlying the avoidable wastage in industrial injuries, are based.

I intend to confine my remarks to what may, for lack of a better term, be called the 'after-treatment' of these cases, and will leave others more competent than myself to deal with the initial stage of treatment, though, in passing, perhaps I may be permitted to say, a study of our material *does* suggest that there is ample room for investigation and discussion of this stage.

I began to take into my hospital a small number of these chronic cases, at the request of one or two of my colleagues, for the first time in 1924, but it was not until 1926 that I commenced to take a few regularly. The material was extremely varied, including old fractures of all kinds, old joint injuries (including old dislocations), old head injuries, post-operative cases, back injuries, so-called traumatic neurasthenias and other functional conditions, and I am afraid a few cases of genuine malingerers.

It is quite impossible in a short time to attempt to analyse these cases fully, but, in order to give some idea of the variety of the material, and at the same time to attempt to deduce the causes of this wastage, I propose to take the first 165 consecutive cases, and to divide them into clinical groups: I have taken this figure because the after-history of this earlier batch has been checked, whereas I am unaware of the exact position with regard to the employment of the later cases.

Before grouping these cases I should like to run quite quickly through a few figures relating to them:

Analysis of First 165 Cases Treated at Crewe Centre:

78 had had some portion of their treatment at one or other of the general Hospitals.

82 had been treated under the National Health Insurance throughout.

115, or 70%, were considered, on discharge, to have made sufficient recovery to return to their pre-accident employment; of these, 76 had apparently made full recovery, while the remainder had made sufficient recovery for the purpose of their employment.

50 after short periods of observation and treatment were not considered likely to make sufficient recovery to be able again to take up their former duties, and were discharged.

The duration of incapacity prior to admission to Crewe amongst the 115 cases in which, on discharge, full or sufficient recovery took place for return to their former duties, was as follows:

2	showed	periods	of	3	years	and	over.
6	"	"	"	2	"	"	"
10	"	"	"	1	"	"	"
16	"	"	"	9	months	"	"
26	"	"	"	6	"	"	"
21	"	"	"	5	"	"	"
14	"	"	"	4	"	"	"
10	"	"	"	3	"	"	"
10	"	"	"	2	"	"	"

45 of these 115 cases had had hospital treatment, and the aggregate incapacity periods totalled 491 months, or 40 years.

67 of these 115 cases had been treated under the National Health Insurance throughout, and the aggregate incapacity periods totaled 513 months, or 42¾ years.

3 of these 115 cases had no available record of treatment.

112 cases, therefore, out of the 115 who made recovery had incapacity periods prior to admission amounting to 1,004 months, nearly 84 years, or an average of 9 months per case.

The duration of treatment at Crewe of these 115 recovery cases was:

0	showed	periods	of	2	months.		
2	"	"	"	6	weeks.		
5	"	"	"	5	weeks	and	over.
11	"	"	"	4	"	"	"
23	"	"	"	3	"	"	"
30	"	"	"	2	"	"	"
32	"	"	"	1	week	and	over.
12	"	"	"	under 1 week.			

The duration of treatment in these cases totalled in aggregate 71 months, or 5½ years, or an average of 17 days per case.

The figures showing the incapacity periods of the 115 recovery cases prior to their admission to Crewe, when

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FRANK E. REDMOND, MANAGING EDITOR

VOL. 3 JUNE, 1934 No. 6

viewed alongside those representing the duration of treatment at this centre give, I think, some food for thought; the former would appear to suggest that the original injuries must have been of exceptional severity; the latter that at the time of admission there was little amiss.

If the former view were *true*, it would embrace the idea that after long and patient active treatment, these men were approaching the stage of full recovery when admitted. Actually, however, the facts are these—

None of these men was having any active treatment at the time of admission, and some of them had not had any for months. Their condition as regards function was entirely stationary, and in many cases had been for a long period.

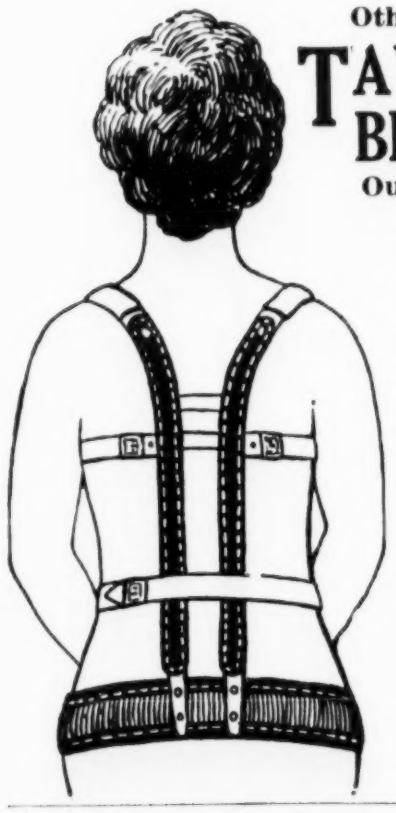
With the exception of the 'work shys' and one or two malingerers who formed a small group, the great majority of the men presented a picture of total incapacity, nor did there appear to be, without active treatment, any prospect of recovery of function; the remainder gave the impression that their return to duty might be indefinitely delayed unless some help was forthcoming.

The original injuries had *not* for the most part been of great severity, but most of them could be classed as 'moderate,' and quite a number as 'minor'; the fact that 67 were treated under the national Health Insurance is, I think, proof of this; furthermore, quite a number of these minor cases, with already months of incapacity behind them, and the prospects of an indefinite period ahead, should, with effective measures, have regained full recovery of function within quite a brief period following their injuries.

The idea that a 'mental' factor lay at the back of all these cases would also be wide of the truth; actually, although this was a prominent feature in some and apparently the sole trouble in others, 58 out of the 115 cases consisted of men with definite surgical disabilities as the sole cause of incapacity; men keen and anxious to obtain recovery, with months of incapacity behind them; and disabilities which did not call for any special surgical skill, but merely some help over real difficulties, which they were apparently powerless to overcome.

One conclusion can, I believe, be safely come to from these figures, and that is that employers, insurance companies, and through them the public, are incurring the expenditure of enormous unnecessary sums—I am presuming, of course, that this same wastage is taking place in all industry throughout the country—as the result of ineffective measures for dealing with traumatic cases after the initial stage has passed.

It became necessary to trace the after-history of this series of cases for the purpose of determining whether this work had a real economic value or not; for all I knew quite a number of the men might have failed to make good after discharge, and I was quite prepared to hear that a certain percentage of the 'functional' cases had done so. My company, therefore, undertook a scrutiny of each case in 1930, and it was found that of the 70% certified fit for their former du-



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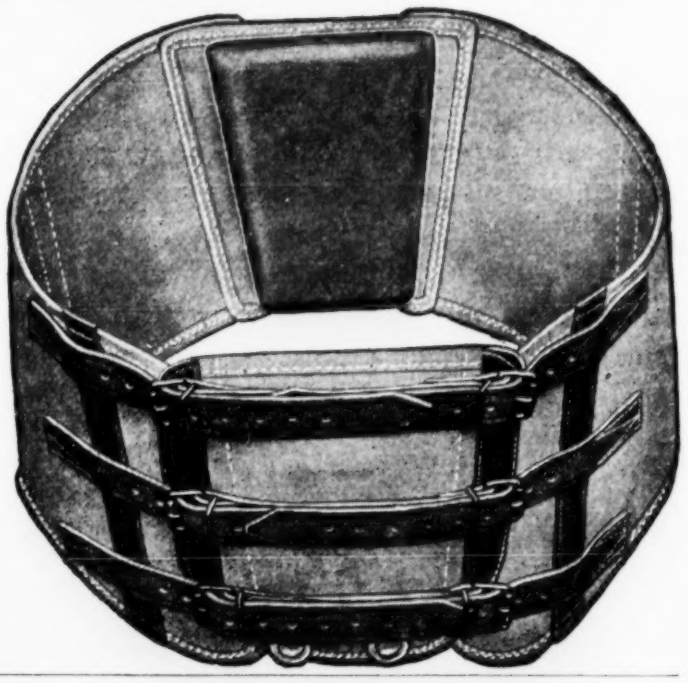

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ties on discharge, actually 65% returned to duty and were carrying out their former work at the time of this enquiry. This actually was a much higher figure than I expected, in view of the pitfalls after discharge.

Now let me come back to a brief analysis of this series of 165. They may be divided for this purpose, I think, into the following clinical groups:

1. Those in which the surgical condition *per se* was the sole incapacitating factor. This group is represented by 78 cases of the total number.

2. Those in which the surgical condition was still an incapacitating factor, but in which recovery had been definitely impeded by a psychological factor; 21 cases.

3. Those in which the surgical condition *per se* appeared to be almost negligible as a cause of incapacity but was a genuine and serious disability in the patient's mind; 28 cases.

4. Those in which the surgical condition appeared to be non-existent as a disabling factor at this stage, though the symptoms complained of suggested very definite incapacity, but without a genuine mental basis. This group included the 'work shys' and the real malingerers, and is represented by 17 cases.

5. Those in whom the surgical condition was definitely masked by constitutional defects, which alone sufficed to prevent a re-entry to pre-accident duties; 21 cases.

None of this last group is numbered, of course, among the 70% who were fit to return to their ordinary duties, and the difference between the 65% who actually returned and remained at their former duties, and the 70% who were apparently fit to do so, *i.e.* the odd 5% who failed after discharge, is largely made up of the 'work-shy' group. But in addition to this group there were one or two in the purely mental group who reverted — in one case because the man was told when he reported for work that there was none for him, and was immediately faced with an economic problem he did not care about, and consequently went to his doctor, presented his old picture and got a further certificate of incapacity. This case illustrates the importance of cooperation between the employers and the persons responsible for treatment: one may spend an enormous amount of time getting a man functionally fit, mentally and physically, but if he is badly handled

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on discharge one can hardly blame him if he takes the course of least resistance and manufactures his old symptoms and becomes a genuine malingerer.

I have not included any man in the recovery figures who was only fit for light duty, but only those who were definitely fit to return to their former employment.

TABLE 3

CLINICAL GROUPS OF THE 115 RECOVERY CASES

Group		Number
1	Injury sole incapacitating factor	58
2	Incapacitating injury + psychological factor	21
3	Injury negligible, but psychological factor marked	19
4	The work-shy and malingerers	17
		115

The cases contained in Group 1 in which the surgical disability was the sole incapacitating factor, illustrated, I think, in the first place, that treatment is not as a rule sufficiently intensive and persistent to lead to early restoration of function, and that owing to the large numbers which have to be dealt with in the massage departments it is impossible to give adequate personal attention to the individual. This class usually gets passive treatment in the form of massage, electricity and passive movements, and is handled by different people for an allotted period two or three times a week, but with it he has no active treatment in the form of gradual increasing stresses of exercise. The history which practically every one of our cases gives is the entire absence of anything of this kind, although the patient may be told to carry out exercises at home, which as a general rule he does not do, or if he does, fails to carry them out properly. The result of this is that the individual remains more or less stationary, is never helped through a period of real difficulty, that is the discomfort which he must inevitably have in the initial stages of active movement, and consequently he gives up any attempt to help himself. Eventually the massage sister reports that everything has been done that can be done, and he is discharged by a resident medical officer, who has only seen him at very infrequent intervals, and who has to rely almost entirely on the information imparted by the sister. Some of the men actually get their discharge, so it appears, from the sister without seeing any medical officer at all.

The man is often discharged without a proper estimate of his actual capacity having been made, which can only be established by proof of the ability of the injured part to stand up to a definite amount of stress over a period. A discharge, therefore, before there is sufficient recovery of function to resume his normal employment, and far short of the maximum recovery possible, with the result that he becomes definitely established wastage.

This lack of continual surgical supervision which alone gives the necessary stimulus to activity and the confidence to overcome the early difficulties appears to me a very important factor. I believe it is the lack of this help which accounts for so much delay often, in those cases which eventually obtain adequate restoration of func-

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tion, and which is responsible for the failure to obtain maximum restoration in others. Furthermore, I believe that a large volume of the passive treatment given is a pure waste of time, unless accompanied by increasing active movement. To obtain the quickest results necessitates almost daily handling, continuous supervision, and much expenditure of time, until the real difficulties have been surmounted.

Men for whom there are definite prospects of sufficient recovery of function, and in whom the desire to obtain the recovery is alive, react in a most amazing manner when once they have been helped over their initial difficulties, but I am convinced that avoidable wastage of this description will continue to go on until some scheme is devised, which will secure for these people much more intensive treatment, in which active cooperation is a bigger factor than all the other adjuvants, and in which daily progress is carefully watched, and exercises, graduated to the ability to stand increasing stresses, carried out under surgical supervision; the time limit of each treatment being made to suit the case and not the Institution.

I must say a few words regarding those cases which I have put into Groups 2 and 3, and in which the mental attitude towards the injury becomes an important and, in a considerable number of cases, the supreme factor against recovery. This relation of the mind to injury is undoubtedly of great importance; it is responsible for a vast amount of wastage, and does not appear to me ever to have been properly tackled. There is some adverse mental reaction in nearly every case of injury, though, fortunately, it does not become prominent in the majority, and it is not by any means the severe injuries in which the mental reaction is the greatest, and indeed, in some the injury has been comparatively trivial.

No two cases react alike, and consequently each case requires different methods of treatment. This cannot be properly directed until each one has been subjected to an intense personal study. In some there is a marked fear that if they are not particularly careful the slightest thing will prevent recovery for all time; they have been told to be very careful, and this has been magnified in their minds to an absurd degree; they have consequently done nothing for fear of doing themselves harm. These are the easiest cases to treat, for one has only to gain their confidence, and with this, reassurance, coupled with a little help over their initial difficulties, and a sympathetic handling, there follows cooperation, which is the crux of the business, and without which no cure will be effected.

Others are obsessed with the enormity of their injury, and are convinced that they will never be any better; quite a number of them have been told so by their own doctors. They are apathetic, they look abjectly miserable, their pains are always frightful, and they would like to sit and brood just as they have been sitting and brooding for months past.

There is no time to go fully into the methods adopted to deal with these cases; in brief, apathy has to be got rid of first of all by coaxing, bullying or in other ways; I make them take an active part in the work of the place, and when some gleam of interest has been aroused I coax, or push, or bully them still further, through gradualy increasing stresses until they discover that they are not so bad as they thought; then comes reassurance, interest and cooperation.

Others, again, have become resigned, after a long period of incapacity, to the idea that the injured part will never function again. They have had all sorts of treatment, and are quite satisfied that anything further is useless. They are not depressed, but give the impression of being rather proud of their disabilities and of the sympathy they receive; they are talkative and tell you all about their hospital treatment, and what everybody said about them, and they appear to be conferring a favour on you by coming to your miserable little place.

This type has to be deliberately antagonised and subdued before a start can be made to convince them that full recovery is going to take place.

And so on through the so-called traumatic neurasthenias, with their tremors, increased reflexes and phobias, etc., to the 'work-shys' and malingerers.

In *my* practice, where one is handling the men daily, it has been possible to prevent the mental reaction from getting a grip. Those showing signs of making heavy weather, or of being resistant, are spotted early and specially handled, with the result that there is very little prolongation of incapacity on this account.

If it is agreed that the goal to which the treatment of traumatic conditions should be directed is the maximum recovery of function, then it is essential that the mental factor should be dealt with, when present, from the earliest days, and not allowed to become rooted.

I know of no harder or more trying work, or work requiring so much expenditure of effort, as these particular cases demand, at any rate at the stage at which we received them, if a successful result is to be achieved. Under the present arrangements of hospital and panel practice no one appears to have the time to devote to this side of the work, the importance of which cannot be exaggerated, nor do I see how it can be properly tackled in the overcrowded out-patient departments, or in the busy industrial practices; but it is work which unquestionably needs to be included in any real effort to reduce industrial wastage.

The secret of any success we may have had in this direction—and it has been considerable—rests, I think on several factors.

First of all the men are away from their home surroundings, away from domestic irritations and worries, and, in some cases, over-sympathetic relations;

They are well housed and fed;

They are made to take an active part in the work of the place;

They are handled by the staff and myself according to their various reactions; some of them have to be entirely ignored for a day or two until they see that it pays not to be obstructive or childish; others are sympathetically handled from the start;

They are in contact with acute surgical cases who are only too anxious to get better, and are made to wait on them;

They are handled daily and forced over their difficulties and out of their apathy by talks, supervision of exercises, and the personal touch. This is one of the advantages of a small place; they cannot get lost in a multitude.

Eventually those who are going to cooperate and get better absorb the esprit of the place and go ahead rapidly. Those who have got keen and are cooperating well are allowed home for an occasional week-end, whilst the resistant ones are not.

These are some of the factors which help to restore mental balance, and result in recover of function, and no scheme for dealing with the after-effects of injuries can be considered

complete unless it embraces this problem.

I have so far said little with regard to the relationship of the National Health Insurance to the treatment of injuries. You will see from our figures that 67 of the recovery cases were under the care of their own doctors throughout the period of their treatment; the remainder had their initial and intermediate treatment at one or other of the hospitals, but came under the care of their doctors on discharge from hospital treatment. Therefore, the whole 115 recovery cases have been under the care of the National Health Insurance at some period of their treatment.

It must be assumed, in the case of those men who had undergone hospital treatment, since certificates of incapacity continued to be issued to them after their discharge, that these men had not made full recovery of function at the time of their discharge. I could obtain no evidence of any active treatment having been given to these cases under the National Health Insurance, at any rate in the later stages of treatment. The history of nearly every one of them was of a visit to his doctor once a week and the provision of a prescription for lotion, liniment, or ointment, as the case may be, and at the same time the issue of a continuing certificate of incapacity, a state of affairs to go on apparently indefinitely.

I have no doubt that those requiring surgical interference and treatment which does not call for transfer to hospital in the early stages, are dealt with quite efficiently under the National Health Insurance, and that any amount of good work is done and good results obtained amongst those who do not require, or demand, for their full restoration active treatment at a later date, but for those who do (and they are by no means small in number) one must search for the reason of the failure of the National Health Insurance to influence their recovery.

I am convinced myself that there is no active treatment available under the conditions of panel practice, however keen and efficient the doctors may be, for that class of case, in which such treatment is essential to restoration.

The doctor in a busy industrial practice has neither the time to devote to these people nor the accommodation or material for the necessary activity, nor has he sufficient control over the individual patient. So long, therefore, as there is a complaint of incapacitating symptoms, and if appearances suggest that they may be present, beyond giving advice he is powerless to do anything in a really active way. Thus, the case drifts along, and, as the doctor has not the means to prove the actual amount of function present, he is bound to accept the position as presented by the patient, and so he continues to issue certificates of incapacity *ad infinitum*.

For the same reason as regards hospital cases, I believe that unless the patient has recovered full function on discharge, there is no further real active treatment available for him afterwards.

I hope I have been able to show, however imperfectly, that there is a real need for a very thorough investigation of this subject of avoidable wastage. The amount of money represented by this must be colossal, and I *do* think that corporations who make such large contributions to the hospitals of the country—my own com-

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pany through their hospital fund subscribe nearly £180,000 annually, £45,-000 of which is contributed by the employer — are entitled to the best services obtainable, and should not be saddled with wastage that is avoidable by efficient treatment.

The National Health Insurance too —since it enforces large contributions from industry for the purpose of treatment—must accept equal responsibility with the hospitals, to devise means whereby this alarming wastage may be reduced to, at least, reasonable proportions.

It would be grossly unfair to saddle the burden of responsibility for the present state of affairs on to the shoulders of the panel doctors under the existing arrangements of panel practice.

And lastly, may I say, I am profoundly convinced myself that a thorough and collective study of this subject in all its phases, by all parties who have a direct or indirect interest, should lead to the formation of some service which will reduce this avoidable wastage in the future.

I believe that any remedy must be sought on the following lines:

The initial handling of cases of severe traumatism, including fractures, should be in the hands of persons who have specialized in this particular class of work. This appears to me to be of supreme importance, and the foundation of any dam which may be built against traumatic wastage;

Sufficient bed space should be available to allow cases to be detained until the maximum benefit has been gained;

The remedial department should cut out much of the passive treatment and devote much more attention to the active cooperation of the patient in his treatment;

Treatment in this department should be intensive and carried out daily, always under direct surgical supervision, with special concentration on resistant cases;

The mental side of each patient should be studied and treatment directed accordingly;

No case should be discharged from treatment until the maximum restoration of function has been established;

The clinical progress showing the improvement made, and the increasing stresses sustained, should be carefully recorded;

Cases treated under the National Health Insurance who are proving re-

sistant in any way, and whose incapacity period has exceeded the normal expectation, should be transferred to the remedial department of a traumatic centre for treatment, and, if necessary, treated as in-patients;

On discharge from treatment a certificate should be issued by the hospital recording their views of the amount of function regained, for the benefit of the doctor, and to help him in his further certification.

The foregoing suggestions lead me to advocate:

(a) The entire separation of the traumatic work from the ordinary work of the general hospital; this would involve of course specially trained resident and nursing staff and an entirely separate remedial department; the whole under the control of an orthopœdic surgeon.

(b) The establishment of traumatic centres throughout the country, also staffed by specially trained residents and nursing staff, under the control of one or more orthopaedic surgeons; the essence of the whole business being expert team work, extending into the remedial department, so that each individual is handled throughout his treatment by the same personnel.

(c) The provision in the centres of varied forms of occupation for the men, each selected to suit the particular needs of the individual, including workshops and other employment in connection with the premises, all with a view to assisting recovery of function.

(d) The linking up of these centres with first aid stations, through the medium of the Red Cross and St. John Ambulance brigades, where the patient would have such treatment as might be necessary, including measures for dealing with shock, carried out under the supervision of one or other of the local profession, and pending his removal by ambulance to the centre.

(e) And lastly, and this appears to me to be most important, the provision of treatment in the remedial departments, for all cases under treatment by the National Health Insurance, whose period of incapacity in relation to the actual injury has exceeded, or is in the opinion of his doctor likely to exceed, the normal limits, including the provision of in-patient treatment in all cases in which removal from home may appear desirable during the continuance of such treatment.

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The article points out that, according to a survey made by the Edison Electric Institute of 1,907 industrial plants, the average intensity of light was found to be 2.85 foot candles, hardly enough for casual seeing, much less for careful workmanship, considering that near a window in the daytime 200 foot candles are commonly recorded, and outdoors 1000 foot candles are registered.

While some industries have made notable strides in improving lighting conditions, industry as a whole has been slow to realize its benefits. The effect of proper illumination on production is so positive, it is a wonder that there are any dark places left in industrial plants. Poor light puts workers under a strain; fatigue sets in sooner; loss from "rejects" becomes excessive, and fewer units are produced. On the other hand, improved illumination speeds up production and results in lower costs all around. Good light is also good insurance against accidents. And yet, although great attention is paid to work hazards, too often an injured worker say, "I didn't know I was so close," or "I couldn't see what I was doing."

In addition, well-lighted plants are kept cleaner. In the dull, dingy factory, workers grow careless; tools are not returned to the proper places, waste is thrown on the floors, dark corners fill with refuse. But dirt does not fit into a brightly-lighted plant; it is too evident. The well-lighted factory not only looks cleaner—it's bound to be cleaner.

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Generator Acceptable,' published in *J. A. M. A.*, April 28, 1934. The reflector of the lamp may be detached and used as a hand lamp when desirable. An orificial applicator is furnished which may be used in the ear, nose or throat, vagina, rectum or urethra, coming in direct contact with the tissues without any heat effects. In contrast with former quartz lamps, this generator is guaranteed for two years to maintain a constancy of intensity. Some interesting references on the indications for ultraviolet therapy are available. The Council on Physical Therapy of the American Medical Association reports its value in a number of diseases in *J. A. M. A.*, for January 30, 1932. Other references are: 'Energy Distribution in the Irradiation of the Human Body with Ultra Violet Rays from Artificial Sources,' J. Severy Hibben, M.D., *Archives of Physical Therapy, X-Ray, Radium*, November, 1931; 'Physiology of the Mercury Line 254 Mu,' Albert Bachem, Ph.D., *Archives of Physical Therapy, X-Ray, Radium*, October, 1932; and 'Ultraviolet Therapy in Dermatology,' George M. Mackee, M. D., *J. A. M. A.*, April 30, 1932."

New Books

"PNEUMONOKONIOSES (Silicosis) — Bibliography and Laws."—By GEORGE G. DAVIS, M.D., F.A.C.S., Associate Clinical Professor of Surgery, Rush Medical College, University of Chicago; Attending Surgeon, Cook County Hospital; ELLA M. SALMONSEN, Medical Reference Librarian, The John Crerar Library, Chicago; and JOSEPH L. EARLYWINE, of the Chicago Bar. Foreword by E. R. LE COUNT, M.D., Professor and Chairman, Department of Pathology, Rush Medical College, University of Chicago. Published by *Industrial Medicine*, Inc., 6x9. 482 pp.; Cloth, $7.50.

This book is an exhaustive compilation of the references to the pneumonokonioses (silicosis) in the literature of the world; the compilers believe they have not omitted any reference of major importance, and very few, if any, of minor importance. Several years of research make this bibliography so complete that writers on the pneumonokonioses (silicosis) need no longer append bibliographical or reference lists. It will be sufficient for them to say: "The bibliography of this subject has been brought up to date and is available in book form."

In the words of Dr. E. R. Le Count, "this unique compilation of references is not only opportune, it is overdue." Scores of industries have spent large sums of money for hurried, and necessarily only partial, surveys of the literature of silicosis; and numerous medical men have wished they could find a more complete list of references than any heretofore available to them. This answer to the need of 10 years covers the whole subject; the book contains every available reference to the pneumonokonioses (silicosis) in the literature of the world, from the first reference in point of time of publication, in Agricola's "De re metalica," in 1556, to the last published articles in 1933. The standing of the compilers in their respective professions—medical, library, and law—gives their joint effort a highly authoritative importance.

The book has two sections. The first is the BIBLIOGRAPHY, which is followed by a subject index, an authors index and a reference-year index and an index of reference headings. The second is the LAW, containing a summary of the occupational disease laws, workmen's compensation laws and common laws of the states of the United States, together with decisions as they relate to the pneumonokonioses (silicosis). The law summary is followed by an index of states and an alphabetical index of the cases. Among the original features of this book are, first, an exhaustive cross-indexing, and, second, a size and arrangement of typography conducive to quick and easy reading.

The compilers and the publishers intend to issue supplemental volumes for successive years; the first supplement to appear shortly after January 1, 1935, to cover all the published references of 1934, with the more important references annotated.

Physicians and surgeons, lawyers, industrial executives, insurance officials, industrial boards and state commissions, journalists, engineers, writers, and research workers will find this book indispensable.

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